REPORT

ON THE

Cawnpore Agricultural Experiment Station

FOR THE

Kharif and Rabi Seasons, 1891-92.

ALLAHABAD:

NORTH-WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.

1892.

Price Rs. 2-8-0.

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Dated Cawnpore, the 10th September 1892.

FROM

J. O. MILLER, ESQ.,

DIRECTOR OF LAND RECORDS AND AGRI., N.-W. P. AND OUDH,

TO

THE CHIEF SECRETARY TO GOVERNMENT,

N.-W. PROVINCES AND OUDH.

SIR,

I HAVE the honor to submit the Report on the Government Experimental Farm at Cawnpore for the year ending 30th June last.

2. The Farm is under the immediate supervision of the Assistant Director, and the programme of operations for the last year was drawn up by Mir Muhammad Husain, who was in charge at the beginning of the season. On his deputation to Hyderabad the control of the Farm came into the hands of Saiyad Muhammed Hadi, who retained it till April, when ill-health obliged him to go on leave. The report has, therefore, been drawn up by Babu Lachman Parshad, the Officiating Assistant Director, who, though he was not in actual charge during any part of the year in which agricultural operations were in progress, is well acquainted with the methods followed and with the results of the experiments, and is thoroughly qualified to report on them.

3. Tables have been added to the report to show the result of experiments conducted during the last ten years, and from them a better idea can be obtained of the value of the various manures that have been tried and of different methods of treatment and varieties of seed than is possible on a consideration merely of the trials of a single season. It would appear from these that chemical manures, and the more expensive manures generally, have a less marked effect in increasing the outturn than the ordinary farmyard manures within the reach of the native agriculturist; and when the cost is taken into consideration the profits of the former class are not unfrequently reduced to a minus quantity. The refuse of the woollen mills has been found to be a very valuable fertilizer, and next to that there is nothing better for ordinary crops than mixed farmyard manure. Recently some difference of opinion has arisen amongst the best authorities on the subject as to the loss of manurial elements caused by the native practice of using cow-dung as fuel; and the experience of the Farm is in favour of the view that the ashes have little value. The Assistant Director recommends the addition of saltpetre to the ashes, and he informs me that the value of saltpetre earths for manurial purposes is fully recognised by the native agriculturist. The sowing of wheat after indigo appears to be financially a most successful rotation of crops, and green soiling with hemp has given excellent results in the past season, though it has not always proved so satisfactory.

4. That improved ploughs give better results than the native plough is now an axiom at the Farm; and the use of deep ploughs, where effective supervision is possible, as at the Stud Farm at Babugarh and the Botanical Gardens, Saháranpur, confirms the experience gained here. At the same time the use of the improved plough spreads slowly. Cultivators in the neighbourhood of the Farm are glad to hire them occasionally, and landlords buy them from time to time; but as far as I can ascertain a stubborn though

passive resistance to their introduction is offered by the native ploughman, who does not appreciate the advantage of economizing labour.

5. Experiments with imported varieties of seed have rarely been satisfactory, one of the few exceptions being Cape oats, which have given a uniformly good outturn. Other oats and foreign barleys and wheat have yielded very much less than the local varieties. There is now a good demand for oats for seed, to meet which a large quantity must be grown in future.

6. An Arab stallion was sent to the Farm in May 1891, but it has not as yet proved very successful. The system followed at Babugarh of breaking the stallion into agricultural work has been adopted, and the health of the animal has much improved since he has been regularly used in the plough. No particular difficulty was experienced in training the horse to plough; but the pace at which he works makes the ploughman's task much harder than in ordinary circumstances.

7. The Farm is in good order, and the valuable stock of machinery and implements has recently been re-arranged so as to allow of more easy inspection by visitors.

I have the honor to be,

SIR,

Your most obedient servant,

J. O. MILLER,

Director.

REPORT

ON THE

CAWNPORE AGRICULTURAL EXPERIMENT STATION

FOR THE YEAR 1891-92.

Rainfall.—There was a good shower on the 25th of May 1891, but the regular rains did not commence till the 17th of July. From that date to the middle of August the showers were light and irregular. Subsequently they were exceptionally heavy and continuous till the end of September. From October to January there was hardly any rain. In February there were a few light showers. The following table shows the actual and normal rainfall and number of rainy days in each month from May to April :—

Month.	Rainfall.		No. of rainy days.	
	In 1891-92.	Normal.	In 1891-92.	Normal.
May	·80	·52	1	1
June	·18	3·11	1	4
July	4 75	10 25	9	12
August	24 92	10·08	18	12
September	13·23	4·33	14	7
October	·35	1 22	1	2
November	...	...	...	...
December	...	·34	...	1
January	·22	·64	1	1
February	·90	·28	4	1
March	...	·25	...	1
April	...	·11	...	1

2. **General character of the season.**—The shower of May assisted the early ploughing operations, but the delay in the setting in of the regular rains greatly delayed the sowing of maize and cotton, with which most of the experiments in the kharíf season are conducted. The light rains of July proved very beneficial for weeding and ploughing the land for rabi crops, but the heavy rains of August and September did considerable damage to the standing crops. The average yield of maize and cotton was in consequence poor, on manured land the outturn was only 933 and 72 lbs per acre respectively, as compared with 1,172 and 117 lbs in the previous year.

The lateness of the winter rains was not much felt, all the land being protected by irrigation from the canal, a distributary of which traverses the station. The supply of water was regular and sufficient. The showers of February, in the case of many fields, saved one watering, which would otherwise have been given. There were comparatively few cloudy days, and the crops did not suffer from rust, except in a few fields in low land close to the distributary. Up to the end of February the spring crop promised to be a remarkably good one, but in March high and hot winds set in unusually early and shrivelled up the grain. The result was a considerable falling-off both in the average and in the maximum outturn of the rabi crops as compared with other years. The following figures show the average and the maximum yield of wheat, per acre, in 1891-92 and the preceding two years :—

Year.	Average yield of wheat per acre. lbs	Maximum yield of wheat per acre. lbs.
1891-92	1,133	2,089
1890-91	1,300	2,904
1889-90	1,420	2,856

3. **Experiments.**—The experiments conducted during 1891-92 were directed to show the effects of—

(*a*) Different kinds of manure.
(*b*) Deep and shallow ploughing.
(*c*) Early and late sowing.
(*d*) Different methods of sowing.
(*e*) Restricting the growth of plants when running to leaf.
(*f*) Taking a second crop from seed sown in the previous year.
(*g*) Varieties of imported and indigenous seed.
(*h*) Outturn of mixed crops.
(*k*) Rust, how to prevent it.

4. **Manure experiments.**—The following experiments were tried with manures :—

(1) To determine the effect of nitrogenous manures applied singly and combined with non-nitrogenous fertilizers on maize and wheat.
(2) To determine the effect of green manuring.
(3) To ascertain the comparative value of certain animal manures and of saltpetre on maize.
(4) To determine the effect of gypsum on leguminous crops.
(5) To determine the effect of certain miscellaneous manures on cotton, wheat and potatoes.

5. **Manure experiment No. I.**—This experiment was started in 1879-80 ; its original object was to ascertain the effect of nitrogenous and non-nitrogenous manures on maize and wheat. A careful consideration of the results obtained in four years (1879-83) proved the futility of applying non-nitrogenous manures by themselves ; and in 1883-84 a nitrogenous manure was added to the plots, which had hitherto been treated with non-nitrogenous manures only, and the experiment assumed its present form, which may be regarded as an attempt to determine the effect of nitrogenous manures only, as compared with the same manures reinforced with a non-nitrogenous fertilizer.

6. **Treatment.**—The experiment is conducted in four series. Each series consists of thirteen plots of 400 square yards each. For every plot in one series there is a corresponding plot treated with like manure in the other three series.

Plots in series No. I are cropped every year with maize.
Ditto No. III ditto ditto wheat.
Ditto Nos. II and IV are cropped alternately with maize and wheat.

Thus in series I the plots bear a maize crop after a fallow of nine months ; those in series No. III bear a wheat crop after a fallow of six months ; while in series II and IV maize follows wheat after a fallow of three months and wheat fallows maize after a fallow of rather more than a year.

All the plots of each series receive the same number of ploughings, weedings, waterings, and are sown with the same quantity of seed ; and further, all these operations for every plot in the series are performed at one and the same time. The maize grown on these plots is of the variety cultivated in Jaunpur, which is superior to the local variety, but comes to maturity nearly a month later than the Cawnpore variety. The wheat is the soft white wheat of Muzaffarnagar. The plots in the several series received the following treatment during the year under report :—

No. of series.	Manure.	Ploughing.	Weeding.	Watering.	Seed and rate per acre.
I	See next table.	2	2	*Nil.*	Maize 12 lbs.
II	do.	2	2	*Nil.*	Ditto.
III	do.	5	2	3	Wheat 120 lbs.
IV	do.	5	2	3	Ditto.

7. **Outturn.**—The following table shows the outturn of maize and wheat of every plot during the present year, and the average outturn of each plot from 1881-82 to 1890-91 :—

Serial number.	Manure and rate per acre.	Grain or straw.	Outturn of maize per acre.				Outturn of wheat per acre.			
			1891-92.		Average of 1881-82 to 1890-91.		1891-92.		Average of 1881-82 to 1890-91.	
			Series I.	Series II	Series I.	Series II.	Series III.	Series IV.	Series III.	Series IV.
1	2	3	4	5	6	7	8	9	10	11
			lbs.	lbs.	lbs.	lbs	lbs.	lbs.	lbs	lbs.
	Nitrogenous manures.									
1	Saltpetre 240 lbs.	Grain ..	327	484	1,267	813	1,210	1,258	1,423	1,656
		Straw ...	3,025	2,178	6,479	5.076	2,396	2,614	2,668	3,046
2	Cow-dung 132 cwts.... ...	Grain ...	883	665	1,239	1,181	1,331	1,573	1,310	1,700
		Straw ...	2,057	3,678	5,972	5,539	2,468	2,868	2,508	2,978
3	Sheep-dung 132 cwts. ..	Grain ..	1,512	980	897	1,114	1,730	1,331	1,256	1,545
		Straw ...	5,639	3,146	6,274	6,150	3,376	2,843	2,511	3,155
4	Poudrette 132 cwts.... ...	Grain	496	1,101	1,338	1,413	1,609	1,174	1,353	1,746
		Straw ...	5,445	2,662	6,924	5,992	3,654	2,674	2,553	3,499
	Nitrogenous and non-nitrogenous manures.									
5	Saltpetre 240 lbs. and bone dust 360 lbs.	Grain ...	665	786	1,156	1,008	1,488	1,210	1,429	1,914
		Straw ...	1,694	3,098	6,512	5,669	2,698	2,771	2,550	3,386
6	Saltpetre 240 lbs. and bone superphosphate 240 lbs.	Grain ..	1,053	678	1,104	962	1,379	1,077	1,359	1,767
		Straw ..	3,824	2,105	4,337	4,294	2,577	1,875	2,573	3,122
7	Saltpetre 240 lbs. and ashes of 132 cwt. cow-dung.	Grain ...	1,234	871	1,225	1,092	1,488	1,464	1,255	1,446
		Straw ..	3,388	2,614	7,527	5,834	3,025	2,977	2,259	2,757
8	Cow-dung 132 cwts. and bone dust 360 lbs.	Grain .	653	956	1,470	1,218	1,391	1,525	1,397	1,500
		Straw ...	3,219	3,872	6,764	6,039	2,468	3,158	2,449	2,548
9	Cow-dung 132 cwts. and gypsum 240 lbs.	Grain ...	1,815	944	1,191	1,113	1,258	1,174	1,359	1,551
		Straw ...	3,049	4,235	6,183	5,814	2,662	2,166	2,549	2,625
10	Sheep-dung 132 cwts. and bone dust 360 lbs.	Grain ...	472	1,210	1,349	940	1,476	1,440	1,204	1,680
		Straw ...	4,235	4,888	6,143	5,699	2,686	2,856	2,293	2,982
11	Sheep-dung 132 cwts. and gypsum 240 lbs.	Grain ..	1,198	847	1,140	1,046	1,706	1,754	1,278	1,649
		Straw ...	3,509	2,214	4,354	6,060	3,327	2,977	2,374	3,148
12	Ashes of 132 cwts. cow-dung ...	Grain	641	944	912	624	944	859	1,073	1,459
		Straw ...	2,710	3,751	5,944	4,824	1,863	1,803	1,997	2,482
13	No manure	Grain ...	544	629	775	543	992	956	984	1,245
		Straw ...	2,009	2,178	4,713	3,998	2,226	1,585	1,775	2,290

8. **Maize.**—The heavy rains of August and September affected the different plots very unequally. The plots are situated on a slope, those at the head had therefore in some cases an advantage over those lying lower down, while others had their manures washed away. This explains why the plots treated with poudrette and saltpetre in series I gave a less outturn than the unmanured plot, and the plot treated with sheep-dung and bone dust gave a total outturn of only 472 lbs per acre, while the plot which was treated with sheep-dung alone gave 1,512 lbs to the acre. No safe conclusion can therefore be drawn from the maize crop of 1891.

9. **Wheat.**—In series III the plot treated with sheep-dung gave the highest yield this year, while in series IV the plot treated with sheep-dung and gypsum heads the list. Taking the average of the two series the addition of bone dust to cow-dung and sheep-dung seems to have little or no effect, in other words both cow-dung and sheep-dung appear to be perfect in themselves so far as the requirements of wheat crop are concerned, and do not require to be supplemented with the manurial ingredients contained in bone dust. The application of bone dust in combination with saltpetre is of some benefit, but the increase which it yields is almost altogether absorbed by the extra cost of its application.

The application of gypsum with cow-dung has also proved useless, but in connection with sheep-dung it seems to have a marked effect on wheat. This is more probably due to its property of fixing the volatile compound of this highly nitrogenous manure than to its supply of lime to the soil. The cultivators are no doubt aware of the loss which sheep-dung sustains when allowed to stand long in the sheepfold, and this explains their practice to fold sheep in fields for a few nights just before the time of sowing. In seasons when this is not possible it would be of great benefit to sprinkle a handful of gypsum over this manure to arrest the escape of nitrogen.

Cow-dung when reduced to ashes seems to lose all its manurial advantages for wheat, and this year the plot so manured has proved inferior to the unmanured plot. The

addition of saltpetre, to a certain extent, supplies the nitrogenous elements lost in burning, and it would be a good thing if cultivators were to add to the ashes, before using them as manure, a small quantity of crude saltpetre.

10. The following table shows the increase in the outturn of maize and wheat obtained by an application of the manures, noted in the above table, during the present and in previous years.

Manure.	Grain or straw.	Increase per acre over the outturn of the unmanured plot. Maize (average of series I and II). 1891-92.	Maize (average of series I and II). Average of 1881-91, *vide* appendix I, page 17.	Wheat (average of series III and IV). 1891-92.	Wheat (average of series III and IV). Average of 1881-91, *vide* appendix I, page 18.
Saltpetre	Grain ...	—181	414	260	425
	Straw ...	508	1,407	599	824
Cow-dung	Grain ...	187	551	478	390
	Straw ...	774	1,385	762	710
Sheep-dung	Grain ...	659	501	556	302
	Straw ...	2,299	1,820	1,204	755
Poudrette	Grain ...	212	817	417	451
	Straw ...	1,960	2,066	1,258	948
Saltpetre and bone dust	Grain ...	139	481	375	557
	Straw ...	302	1,835	829	935
Saltpetre and bone superphosphate ...	Grain ...	279	463	254	395
	Straw ...	871	198	320	669
Saltpetre and ashes of cow-dung ...	Grain ...	466	654	502	252
	Straw ...	907	2,289	1,095	430
Cow-dung and bone dust... ...	Grain ...	218	685	484	334
	Straw ...	1,452	2,031	907	466
Cow-dung and gypsum	Grain ...	793	493	242	340
	Straw ...	1,548	1,628	508	554
Sheep-dung and bone dust ...	Grain ...	254	575	484	274
	Straw ...	2,468	1,803	865	459
Sheep-dung and gypsum... ...	Grain ...	436	523	756	496
	Straw ...	768	1,089	1,246	583
Ashes of cow-dung	Grain ...	206	109	—72	151
	Straw ...	1,137	1,013	—72	207

11. **Value of produce.**—The financial result of each manure applied in the two series of maize and wheat is shown in the following table :—

Manure.	Cost of manure.	Value of the increased outturn. Maize (average of series I and II.) In 1891-92.	Maize (average of series I and II.) Average of 1881-82 to 1890-91.	Wheat (average of series III and IV.) In 1891-92.	Wheat (average of series III and IV.) Average of 1881-82 to 1890-91.	Net increase per acre. Maize (average of series I and II.) In 1891-92.	Maize (average of series I and II.) Average of 1881-82 to 1890-91.	Wheat (average of series III and IV.) In 1891-92.	Wheat (average of series III and IV.) Average of 1881-82 to 1890-91.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Saltpetre ...	6·00	—3 62	8·28	11·34	17·85	—9·62	2·28	5·34	11·85
Cow-dung ...	7·00	3 75	11·02	19·34	16·17	—3·25	4·02	12·34	9·17
Sheep-dung ...	8·00	13·19	10·02	23·92	13·44	5·19	2·02	15·92	5·44
Poudrette ...	7·50	—4·24	16 36	19·53	19·26	—11·74	8·86	12·03	11·76
Saltpetre and bone dust.	10·50	2·78	9·62	16·20	22·74	—7·72	·88	5·70	12·24
Saltpetre and bone superphosphate.	17·25	5·58	9·26	9·89	16·16	—11·67	—7·99	—7·36	—1·09
Saltpetre and ashes of cow-dung.	7·25	9 32	13·08	21·62	10·32	2·07	5·83	14·37	3·07
Cow-dung and bone dust.	11·50	4·36	13·70	20·18	13·21	—7·14	2·20	8·68	1·71
Cow-dung and gypsum.	8·50	15·86	9·86	10·34	13 80	7·36	1·36	1·84	5·30
Sheep-dung and bone dust.	12 50	—5·09	11·50	19·99	11·18	—17·59	—1·00	7·49	—1·32
Sheep-dung and gypsum.	9·50	8 72	10·46	30·76	12·47	—0·78	0·96	21·26	2·97
Ashes of cow-dung...	1·25	4·12	2·18	—2·74	5·95	2·87	0·93	—3·99	4·70

Valuation.—The values of maize and wheat grain and of wheat straw are calculated throughout at the following rates, which prevailed in Cawnpore at the harvest time in 1891-92 :—

	Per rupee.
Maize grain	50 lbs.
Wheat grain	30 lbs.
Wheat straw	2 cwts.

The maize stalks are seldom sold ; so long as they keep green they are fed sparingly to the cattle mixed with grass or wheat straw, but by far the largest portion is either thrown into manure pits or burnt in winter. Any value which could, therefore, be assigned to it, must have been very low and could not appreciably affect the gross value of increased outturn ; I have therefore left it out of account.

Cost of manure.—The cost of manure shown in column 2 of the table differs somewhat from the cost given in former years, especially in the case of cow-dung ashes. As the object of the experiments conducted at the Station is to show what the public would gain or lose by using the manures tried on the Station, I have given in this table the cost at which a cultivator can obtain the required quantity, including the price of manure and of cartage to a distance of two miles.

12. **Manure experiment No. II.**—This experiment has been conducted regularly in a series of 11 plots since 1883-84. To compare its results, green manuring with hemp and indigo is carried on in two fields in another part of the Station at some distance from these plots. The seed sown is the Muzaffarnagar soft white wheat, at the rate of 120lbs to the acre. The plots were ploughed five times, weeded twice, and watered three times.

The outturn of the present year's crop and the average produce of previous years are shown in the following table :—

Series.	Serial number.	Manure and rate per acre.	Outturn.				Increase over the unmanured plot in the series.			
			1891-92.		Average 1883—91.		1891-92.		Average 1883—91.	
			Grain.	Straw	Grain.	Straw	Grain.	Straw.	Grain.	Straw.
			lbs.	lbs	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
I	1	Green indigo ploughed in and gypsum 6 maunds.	1,367	3,110	1,518	2,696	677	1,598	466	681
	2	Green indigo ploughed in ..	1,270	3,037	1,544	2,834	580	1,525	492	819
	3	Fresh indigo refuse 120 maunds and lime 6 maunds	1,706	3,642	1,643	3,209	1,016	2,130	591	1,194
	4	Old indigo refuse 120 maunds ...	1,331	2,843	1,620	3,089	641	1,331	568	1,074
	5	Indigo water 3,600 cubic feet ...	665	1,561	1,084	2,130	−25	49	32	115
	6	Wheat sown after indigo crop ...	1,258	2,686	1,326	2,505	568	1,174	274	490
	7	Green hemp ploughed in and gypsum 6 maunds.	1,307	2,444	1,280	2,494	617	932	228	479
	*8	Green hemp ploughed in ...	1,004	1,815	1,206	2,381	314	303	220	454
	9	Hemp water 3,600 cubic feet .	690	1,573	1,123	2,167	...	61	71	152
	*10	Wheat sown after hemp crop had been taken.	641	1,561	1,029	1,962	−49	49	−17	−99
	11	No manure	690	1,512	1,052	2,015	...	...	...	...
II	1	Fresh indigo refuse 120 maunds and lime 6 maunds.	1,004	2,347	1,442	2,858	453	1,433	697	1,398
	2	Fresh indigo refuse 120 maunds alone.	1,047	1,990	1,120	2,504	496	1,076	375	1,044
	3	Old indigo refuse 120 maunds and lime 6 maunds.	968	1,621	1,339	2,596	417	707	591	1,136
	4	Old indigo refuse 120 maunds alone	889	1,615	1,215	2,554	338	701	470	1,094
	5	No manure	551	914	745	1,460	...	...	...	...
III	1	Green hemp ploughed in ...	1,125	2,009	...	...	780	1,452	...	...
	2	Green hemp ploughed in and farmyard manure 50 maunds.	1,065	2,015	...	...	720	1,458	...	...
	3	Farmyard manure 200 maunds ...	750	1,198	...	...	405	461	...	...
	4	No manure	345	557	...	...	...	...	...	...

13. The plot treated with fresh indigo refuse and lime gave the largest yield. It is followed by the plot in which green indigo was ploughed in with gypsum. In the case of both indigo and hemp the plots which were treated with gypsum gave a larger yield than the plots in which indigo and hemp were ploughed in without gypsum. This is another instance of gypsum absorbing the volatile compounds of nitrogen and rendering them available for the succeeding wheat crop. The indigo and hemp water hardly seems to give any increase. There is no steeping vat close to the Station from which water could be brought before the green manurial parts floating in it have time to settle down. For the sake of experiment it is brought in earthen jars a long

* The plot No. 8 was added in 1884-85 and No. 10 in 1885-86 ; in comparing their previous outturn with the outturn of the unmanured plot the average of the latter has been taken for 1884—91 and 1885—91 respectively.

way to the Station, and in the state in which it is applied it is little better than pure water.

14. The following table shows the financial result of each plot in the series and of the two fields in which this experiment was conducted; the average result of the past year's produce is also noted for comparison.

Series.	Serial number.	Manure.	Cost of manure.	Value of increased outturn.		Net increase per acre over the unmanured plot in the series.	
				1891-92.	Average 1884—91.	1891-92.	Average 1884—91.
			Rs.	Rs.	Rs.	Rs.	Rs.
I	1	Green indigo ploughed in and gypsum.	9·75	29·70	18 57	19 95	8 82
	2	Green indigo ploughed in ...	6·75	26·14	20·06	19·39	13·31
	3	Fresh indigo refuse and lime ...	4·0	43·38	25·03	39 38	21·03
	4	Old indigo refuse	3·5	27·31	19 71	23·81	16·21
	5	Indigo water	3·0	—0 61	1·58	— 3·61	—1 42
	6	Wheat sown after indigo crop ...	...	24·17	11 32	44 17*	31·32*
	7	Green hemp ploughed in and gypsum.	5·0	24·73	9·74	19·73	4·74
	8	Green hemp ploughed in ...	2·0	11 82	9 36	9·82	7·36
	9	Hemp water	3·0	0·27	3 05	—2·73	0 05
	10	Wheat sown after hemp crop had been taken	...	—1·40	—1·01	13·60†	13 99†
II	1	Fresh indigo refuse and lime ...	4·0	21·50	29·47	17·50	25·47
	2	Fresh indigo refuse alone ...	2 8	21 33	17 16	18 53	14·36
	3	Old indigo refuse and lime ...	4·7	17·06	24 87	12 36	20·17
	4	Old indigo refuse alone ...	3·5	14·40	20·55	10 90	17·05
III	1	Green hemp ploughed in ...	2·0	32·48	22·31	30·48	20·31
	2	Green hemp ploughed in and farmyard manure.	4 0	30·51	...	26·51	...
	3	Farmyard manure	7·8	15·56	...	7·76	...

Financially the plot of which the indigo crop was cut and sold for dye furnished the best result; while ploughing in a green crop of hemp appears to be the cheapest form in which land can be manured. It is perhaps the most suitable manure for outlying fields to which cow-dung and other bulky manures cannot easily be carted; and on the average it seems to give a very good return, especially when gypsum is sprinkled after the crop has been ploughed in.

15. **Manure experiment No. III.**—This experiment was started in 1884. There are 8 plots in this series; each plot is annually treated with the manure noted in the following table and is sown with maize. During the year under report all the plots were ploughed twice and weeded 3 times; while seed was sown in furrows behind the plough, as usually done by the native cultivators of these provinces.

16. The outturn of every plot during the present year and the average outturn during the past 7 years are shown in the following table. Poudrette this year heads the list, and woollen refuse ranks next. Cow-dung and sheep-dung follow next; saltpetre in the case of maize does not give any great increase.

Serial number.	Manure.	Outturn in 1891-92.		Average outturn from 1884 to 1891.		Increase of grain per acre over the unmanured plot.	
		Grain.	Stalk.	Grain.	Stalk.	1891-92.	Average 1884 to 1891.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	Woollen refuse 120 maunds and lime 12 maunds.	1,404	5,288	1,891	8,681	678	1,273
2	Sheep-dung 120 maunds	1,258	5,082	1,347	6,589	532	729
3	Cow-dung 120 maunds	1,258	5,034	1,022	5,735	532	404
4	Poudrette 120 maunds	1,585	5,046	1,490	6,920	859	872
5	Horse-dung 120 maunds	992	4,888	1,118	6,265	266	500
6	Pigs' droppings 120 maunds ...	1,234	4,973	1,093	6,508	508	475
7	Saltpetre 3 maunds	932	5,070	968	3,649	206	345
8	No manure	726	4,537	618	3,644	...	...

* Including Rs. 20, net amount realized by sale of indigo.
† Including Rs. 15, net amount realized by sale of hemp.

17. The financial result of each manure is shown in the following table :—

Manure.	Cost per acre.	Value of increased outturn.		Net increase per acre over the unmanured plot.	
		In 1891-92.	Average 1884—91.	In 1891-92.	Average 1884—91.
	Rs.	Rs.	Rs.	Rs.	Rs.
Woollen refuse and lime ...	5·4	13·56	25·46	8·16	20·06
Sheep-dung	5·3	10·64	14·58	5·34	9·28
Cow-dung	4·6	10·64	8·08	6·04	3·48
Poudrette	5·0	17·18	17·44	12·18	12·44
Horse-dung	4·6	5·32	10·00	0·72	5·40
Pigs' droppings ...	5·3	10·16	9·50	4·86	4·20
Saltpetre	6·0	4·12	6·90	– 1·88	0·90

18. **Manure experiment No. IV.**—To determine the effect of gypsum on leguminous crops it was applied as a sole manure to indigo and in combination with farmyard manure to gram and peas. The following statement shows the result of the present year's trial :—

Crop on which tried.	Manure.	Outturn per acre in 1891-92.	Increase due to gypsum.	
			In weight.	In value.
		Cwts.	Cwts.	Rs.
Indigo ...	Gypsum 240 lbs. ploughed in the soil at the time of sowing.	Plant ... 127	Plant 19	5·32
Ditto ...	Gypsum 240 lbs. applied as a top dressing when the plants were 6" high.	Do. ... 138	Do. 30	8·40
Ditto ...	No manure	Do. ... 108 lbs.		
Peas ...	Gypsum 320 lbs. and farmyard manure 36·5 cwts.	Grain... 1,401 Straw... 2,278	No increase.	
	Farmyard manure 73 cwts. ...	Grain... 1,936 Straw... 4,100		
Gram ...	Gypsum 320 lbs. and farmyard manure 36·5 cwts.	Grain... 2,995 Straw... 2,107	Ditto.	
	Farmyard manure 73 cwts.	Grain... 3,246 Straw... 2,374		

19. This is the fourth year in which the present experiment has been tried. In the case of indigo, gypsum this year gave an increase varying from Rs. 5 to Rs. 8 per acre, the plot in which it was applied as a top dressing giving a larger yield than the plot in which it was mixed up with the soil at the time of sowing. This differs from the results obtained in previous years in which the plot in which gypsum was mixed up with the soil gave better results than the other plot. The following are the figures of the past three years :—

	Outturn per acre.		
	1890-91.	1889-90.	1888-89.
	Cwts.	Cwts.	Cwts.
Field in which gypsum was mixed up with soil ...	53·2	128·5	68·7
Field in which gypsum was applied as a top dressing	48·7	106·3	59·8
No manure	38·1	81·9	53·1

It is thus doubtful which of the two forms of applying gypsum is the more advantageous. But the fact that an application of gypsum increases the weight of indigo plants seems to have been sufficiently established by experiments both at the Station and elsewhere, although the increase which it effects is often not very great. The nearest place whence indigo planters of these provinces and Bengal can have a supply of it is Naini Tal. It may be of some interest to note here the amount which a consignment of this mineral received in 1888 had cost up to Haldáwani, which is the nearest railway station to the Naini Tal quarry :—

	Rs	a.	p.
Cost of quarrying 212 maunds at Rs. 4 per 100 maunds	8	7	8
Carriage to Haldáwani by camels at Re. 0-3-6 per maund	46	11	7
Bags and string	2	0	0
	57	12	3

The consignment being purely for experiment, no royalty was charged.

As regards the experiment with gram and peas, all that can be said is that 320 lbs gypsum reinforced with 36·5 cwts of farmyard manure did not give as great yield as 73 cwts of farmyard manure applied singly.

20. **Manure experiment No. V.**—The following manures were experimented with under this head :—

Manure.	Crop on which tried.
Group A.	
1 Brick kiln refuse	Wheat.
2 Silt	
3 Compost	
4 Road scrapping	
5 Ashes of weeds	
6 Ashes of weeds and saltpetre	
7 Ammonic chloride	
Group B.	
1 Green hemp ploughed in and kainit	
2 Green hemp ploughed in	
Group C.	
1 Farmyard manure and kainit	
2 Woollen refuse and kainit	
3 Farmyard manure alone	
4 Woollen refuse	
Group D.	
1 Fresh silt from canal	Cotton.
2 Kainit and gypsum	
3 Farmyard manure and gypsum	
4 Farmyard manure and kainit	
5 Woollen refuse	
Group E.	
1 Poudrette and sulphate of iron	Potatoes.
2 Woollen refuse and gypsum	
3 Poudrette and kainit	
4 Castor oil cake and gypsum	

The trial with group A. commenced in 1883-84. In the first two years the plots which now receive compost and road scrapping were treated with perished indigo and carrot seed, but since 1885-86 no alteration has been made either in the quality or quantity of the manure applied to each plot. The experiments with B. C. D. and E. were started in 1888-89, and since then they have been regularly carried out.

21. The following table shows the produce of each plot in 1891-92 and previous years :—

Manure and rate per acre.	Crop on which tried.	Outturn per acre.				Increase per acre over the unmanured plot in each series.			
		1891-92.		Average of previous years.		1891-92.		Average of previous years.	
		Weight of wheat grain, cotton fibre and potato bulb.	Weight of straw and cotton seed.	Weight of wheat grain, cotton fibre and potato bulb.	Weight of straw and cotton seed.	Weight of wheat grain, cotton fibre and potato bulb.	Weight of straw and cotton seed.	Weight of wheat grain, cotton fibre and potato bulb.	Weight of straw and cotton seed.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A.—Brick kiln refuse, 88 cwts. ...	Wheat...	678	1,270	1,060	1,964	—12	—109	301	448
Silt 219 cwts.	...	774	1,391	936	1,753	84	12	177	237
Compost 146 cwts. ...	...	1,028	2,105	993	1,979	338	726	404*	819*
Road scraping 219 cwts. ...	...	762	1,682	876	1,809	72	303	287*	649*
Ashes of weeds 132 cwts. ...	...	738	1,742	940	1,972	48	363	181	456
Ashes of 132 cwts. and saltpetre 240 lbs.	...	690	1,476	1,086	2,313	...	97	327	797
Ammonic chloride 240 lbs ...	...	920	2,154	927	1,877	230	775	168	361
No manure	...	690	1,379	759	1,516	...	...	...	...
B.—Green hemp ploughed in and kainit 3 cwts.	...	1,718	3,327	1,250	2,448	641	1,318	270	375
Green hemp ploughed in ...	...	1,012	3,194	1,214	2,267	835	1,185	234	194
No manure	...	1,077	2,009	980	2,073	...	...	...	...
C.—Farmyard manure 146 cwts. and kainit 3 cwts.	...	1,492	2,783	1,544	2,965	—194†	—871†	—79†	—70†
Farmyard manure 146 cwts....	...	1,686	3,654	1,623	3,035	...	...	...	...
Woollen refuse 146 cwts. and kainit 3 cwts.	...	1,097	3,057	1,502	3,046	—992†	—742†	—63†	+127†
Woollen refuse 146 cwts. ...	...	2,089	3,799	1,565	2,919	...	...	...	...
D.—Fresh silt from canal 366 cwts.	Cotton...	149	330	147	256	20	94	47	73
Kainit 320 lbs and gypsum 320 cwts.	...	145	290	160	295	16	54	60	112
Farmyard manure 132 cwts. gypsum 110 lbs.	...	170	412	173	310	41	176	73	127
Farmyard manure 132 cwts. and kainit 110 lbs.	...	138	303	186	330	9	67	86	147
Woollen refuse 88 cwts. ...	...	218	410	245	412	89	174	145	229
No manure	...	129	236	100	183	...	...	...	...
E.—Poudrette 146 cwts. and sulphate of iron ½ cwts.	Potatoes,	3,714	...	12,493	...	—1,166	...	2,590	...
Woollen refuse 146 cwts. and gypsum 3 cwts.	...	4,425	...	11,921	...	—455	...	2,018	...
Poudrette 146 cwts. and kainit 5 cwts.	...	4,800	...	10,157	...	—80	...	254	...
Castor cake 300 lbs and gypsum 3 cwts.	...	4,544	...	11,822	...	—336	...	1,919	...
Cow-dung 146 cwts. ...	...	4,880	...	9,903	...	...	...	...	...

Group A.—The only manures which have given an outturn over 820 lbs, which is the lowest average for irrigated land of this district, are the ammonic chloride and compost. The cost of the former is very high and leaves no margin of profit ; the latter gives a net profit of over Rs. 11 compared with the unmanured plot. It seems that plots Nos. 1, 2 and 4 had enough of brick kiln refuse, silt and road scraping in past years ; while ashes whether of weeds or of dung have no great effect on wheat.

*In comparing the outturn of the plots treated with compost and road scraping with the outturn of the unmanured plot, the average of the latter has been taken for the years 1885-86 to 1890-91.

†Compared with the plot treated with farmyard manure and woollen refuse respectively.

Groups B and C.—Kainit seems to have little effect on wheat; the same happened last year also. Like common salt it seems to retard the growth of the wheat plant, and may perhaps be applied with advantage when the crop is too forward, but not otherwise.

Group D.—All the manures in this group more or less gave an increase over the unmanured plot, but in the case of kainit and gypsum it is not possible to say what portion of the increase is due to them.

Group E.—Compared with past years' outturn of potatoes, the outturn of the present year is very low. A large quantity of the potatoes planted this year failed to germinate in the field, and the crop was very thin and irregular.

22. This experiment is conducted in two series, one consisting of 4 plots and the other of 3 plots. The experiment in the former was started in 1882-83 and in the latter one year after. Up to the year 1886-87 the plots were ploughed as follows and received no manure :—

Series.	Serial number of plot.	Description of ploughing.	Number of ploughings.
I	1	Ploughed with Collin's plough, which in one ploughing turns up the soil to a depth of 9″	2
	2	Ploughed with Watt's or Kaisar Plough, which goes to a depth of 5″	2
	3	Ploughed with native plough ...	4
	4	Ditto ditto ...	4
II	1	Same as pl t No. 1 of series I ...	2
	2	Ditto „ 2 ditto ...	2
	3	Ditto „ 3 ditto ...	4

Since 1886-87 the number of ploughings in each plot has been doubled, and the plots of series II manured with cow-dung at the rate of 146 cwts to the acre, the plots of series I remaining unmanured as before. In other respects all the plots are treated alike and all are sown with Muzaffarnagar wheat.

23. The following table shows the outturn of each plot in the two series :—

Series.	Serial number.	Description of ploughing.	Outturn per acre.			
			1891-92.		Average since 1882-83 to 1890-91.	
			Grain.	Straw.	Grain.	Straw.
			lbs.	lbs.	lbs.	lbs.
I	1	Four times with Collin's plough,	661	1,210	843	1,505
	2	Four times with Kaisar plough.	678	1,339	663	1,304
	3 & 4	Eight times with native plough,	573	1,193	559	1,076
II	1	Same as is No. 1 of series I ..	1,027	2,086	927	1,557
	2	Ditto „ 2 ditto ...	1,021	2,173	895	1,713
	3	Ditto „ 3 ditto ..	1,077	2,290	724	1,515

Taking the average of the two series, the outturn of the plot ploughed 9″ deep in the present year differs by only 5 lbs from the outturn of the plot ploughed 5″ deep, and the outturn of the deep ploughed plots is a little in excess of the outturn of the shallow ploughed plots, which means that for a crown rooted crop like wheat a ploughing of 5″ depth is as good as one of 9″ depth, and that four ploughings with an improved

plough as made at the Station have the same effect as eight ploughings with the native plough. Small bullocks and buffaloes of the value of Rs. 15 to Rs. 30 a pair belonging to cultivators in the neighborhood of the Station easily plough land to a depth of 5″ with one of the ploughs as made at the Station, and as the time taken to plough an acre of land with the improved ploughs is almost the same or rather less than the time taken to plough an acre with a native plough, it follows that ploughing with a Station plough saves at least Rs. 4 an acre, or ⅔ the value of the plough itself.

24. **Early and late sowing.**—This experiment was conducted in two fields. In one maize was sown and in the other cotton. The early sown plots were sown between the 20th and 23rd May, and the late sown between 18th and 20th July. During the interval between the sowing of the early sown plots and the advent of the rains maize was irrigated twice and cotton three times, besides the watering which was requisite to prepare the fields for sowing. The other treatment of the early and late sown fields was similar.

25. The following table shows the produce of the two fields.

Series.	Serial number.	Crop.	Time of sowing.	Produce per acre in 1891-92.		Average produce per acre in 1886-87 to 1890-91.	
				Grain of maize and fibre of cotton.	Stalk of maize and seed of cotton.	Grain of maize and fibre of cotton.	Stalk of maize and seed of cotton.
				lbs.	lbs.	lbs.	lbs.
I	1	Maize	May 20th ...	1,945	3,688	1,344	5,052
	2	... ...	July 18th ...	1,590	3,070	1,063	4,282
II		*Cotton*—					
	1	Varadhi ...	May 23rd ...	120	295		
	2	Bani		115	281		
	3	Dharwari ...		185	447		
	4	Barodha ...		172	417		
	5	Louisiana ...		172	420		
	6	Tree		60	182		
	7	Country ...		172	345		
		Average ...	...	142	341	131	267
	1	Varadhi ...	July 20th ...	50	102		
	2	Bani... ...		30	62		
	3	Dharwari ...		42	110		
	4	Baredha ...		32	57		
	5	Louisiana ...		22	45		
	6	Tree ...		22	46		
	7	Country ...		22	24		
		Average ...	...	31	64	79	164

26. The extra cost of irrigation in the case of early sown plots, and the value of increased outturn obtained by sowing early, are noted below :—

Crop.	Extra cost of watering, including water dues, per acre.	Value of increased produce, per acre, in 1891-92.
	Rs.	Rs.
Maize	5 25	7·1
Cotton	6·5	23·6

In both cases the early sowing left a margin after covering the cost of irrigation. In places where canal water is available, it will be advantageous to sow maize and cotton, specially the latter, a month or six weeks in advance of the autumn rains. The plants thus get a start by the time the rains commence, and are not choked up by weeds, which is very often the case when rains prove heavy and continuous at their

outset. The advantage of the early sowing of cotton is recognized in the Meerut and Agra Divisions, where more than one-fourth of the total area under pure cotton is prepared by irrigation and sown before the rains.

27. **Different methods of sowing sugarcane.**—This experiment is to determine whether the method of sowing sugarcane as followed in the West Indies is better than that usually adopted in these provinces. It was conducted in two fields each sown with four different varieties of cane. Excepting the difference in the method of sowing the treatment of the two fields was exactly alike.

The following figures show the produce obtained by the two methods in 1887-88 to 1891-92.

Year.	Produce per acre. Sown after the West Indies fashion. lbs.	Produce per acre. Sown in the native way. lbs.
1891-92	2,790 (Gur)	2,740 (Gur).
1890-91	5,917 (Juice)	7,153 (Juice).
1889-90	7,562 (ditto)	11,273 (ditto).
1888-89	7,596 (ditto)	8,836 (ditto).
1887-88	8,459 (ditto)	11,118 (ditto).

The figures of this year do not show any noticeable difference between the two methods of sowing cane. The results of the preceding four years were invariably in favor of the native method.

28. **Restricting the growth of plant when running to leaf.**—This experiment was tried on wheat in a field which was divided into three parts. In one part the plants were grazed by sheep when about a foot high, in the other they were nibbled with a sickle, and in the third the crop was left untouched. The treatment of the three parts in every other respect was exactly alike.

The following table shows the outturn of the three parts :—

Serial number.	Special treatment.		Outturn per acre. 1891-92.	Outturn per acre. 1890-91.	Outturn per acre. 1889-90.
			lbs.	lbs	lbs.
1	Grazed by sheep	Grain	813	2,148	1,102
		Straw	3,048	3,999	3,399
2	Nibbled with a sickle	Grain	837	1,053	1,122
		Straw	3,261	2,845	2,881
3	Left untouched	Grain	846	951	1,169
		Straw	3,387	2,140	3,698

29. The outturn of the three plots in the present year does not show any noticeable difference. Last year the result was much in favor of restricting the growth. As expected, the result of this experiment must vary with the character of the winter rains and of the crop. If the rains are early and the crop heavy, grazing or nibbling gives a higher yield, otherwise not. All that this experiment teaches, therefore, is that the operation may be safely performed on a forward crop so long as the plants are not more than a foot high without any detriment to its ultimate yield.

30. **Second crop of seed sown in the preceding year.**—This experiment was tried on sugarcane in two fields, one of which was planted during the year with cane of four different varieties, and the other had ratooned stocks of the same four varieties planted in the preceding year.

The outturn of the two fields is shown below :—

Serial number.	Variety of cane.	Outturn per acre in gur. Of crop planted in 1891-92.	Outturn per acre in gur. From stocks of crop planted in 1890-91.
		lbs.	lbs.
1	Dhaul	2,018	3,289
2	Dikchan	2,978	4,168
3	Baraukha	2,834	2,933
3	Matna	3,235	2,094
	Average ...	2,765	3,121

31. The results of 1890-91 are considerably in favor of the second year's growth. The same was the case in 1890-91, but in 1888-89 and 1889-90 the outturn of freshly-planted cane exceeded the outturn of preceding year's growth. The outturn of the several years' cultivation is noted below :—

Year.	Outturn per acre. Of cane planted during the year. Weight of juice.	Outturn per acre. Of cane planted during the year. Weight of gur.	Outturn per acre. Of cane planted in the preceding year. Weight of juice.	Outturn per acre. Of cane planted in the preceding year. Weight of gur.
	lbs.	lbs.	lbs.	lbs.
1888-89	8,216	1,612	5,863	1,016
1889-90	9,418	Sold as juice.	7,480	Sold as juice.
1890-91	6,685	Ditto.	10,100	Ditto.

32. If the climatic differences of the two years be neglected and the produce of the first year's growth be compared with the produce of the second year's growth then the following results are obtained. The weight of gur shown in this table for 1889-90 and 1890-91 has been calculated from the weight of juice by adopting the proportion in which they stood in 1888-89.

Year in which cane was planted.	Produce in the first year.	Produce in the second year.
1887-88	1,940	1,016
1888-89	1,612	1,452
1889-90	1,829	1,951
1890-91	1,298	3,121
Average ...	1,670	1,885
Value of average produce ...	Rs. 66·8	75·4
Deduct additional cost during the year in which cane is planted.	28 0*	...
Net gain in retaining stocks for next year.	...	36·6

33. **Varieties of seed.**—Imported and indigenous varieties of the undermentioned crops were tried.

Kharif.	Rabi.
Cotton.	Barley.
Sugarcane.	Oats.
Maize.	Rye grass.
Juar.	Lathyrus.
Wheat.	Potatoes.

	Rs.
* Ploughing	10
Seed	8
Sowing	2
Two extra weedings and hoeings	8
	28

The following table shows the results of each variety. Some of these varieties were experimented with in the preceding two years; their figures for those years are quoted for comparison.

Crop.	Variety.	Outturn per acre. In 1891-92.		In previous years.	
		lbs. Fibre.	lbs. Seed.	lbs. Fibre.	lbs. Seed.
Cotton ...	Upland Georgian	54	131	119	272
	Louisiana	50	128	127	308
	S. B. Mexcy	29	64	88	156
	Shine's Early Prolific	18	43	68	143
	Jone's Improved	26	58	88	176
	Sea Island	54	135	127	333
	Hybrid	55	138	123	305
	Egyptian	65	162	124	283
	Tree Cotton	82	181	125	289
	Garo Hills	103	186	150	231
	Hinganghat	64	158	117	274
	Varadhi	85	198	...	...
	Bani	72	171	...	...
	Dharwari	113	278	...	...
	Barodha	102	237	...	...
	Cawnpore	97	184	126	279
		Gur.		Gur.	
Sugarcane ...	Dhaul (from Behea)	2,653		1,594	
	Dikchan (from Saharanpur) ...	3,573		1,563	
	Baráukhá (from Moradabad) ...	2,883		1,469	
	Matná (Cawnpore)	2,664		1,781	
		Grain.	Stalk.	Grain.	Stalk.
Juar ...	Alápur	571	...	...	...
Maize ...	American	Failed.			
	Jaunpur	1,767	3,379	...	...
Wheat ...	*Indian—*				
	Muzaffarnagar	1,334	3,125	1,687	2,658
	Mundia	498	2,351	1,189	2,323
	Buxar	913	2,655	1,147	2,261
	Red Punjabi	947	2,316	...	...
	Sindhi	629	2,351	874	2,990
	Australian and Canadian—				
	Adelaide	1,016	2,973	826	3,370
	Ladoga	210	473	581	1,404
	Red Fern	42	212	97	456
	Judket	73	206	315	460
	White Fife	97	230	194	891
	Red Fife	242	1,053	133	935
	Saponka	67	333	145	654
Barley ...	*Indian—*				
	White huskless	829	1,706	1,093	2,440
	Chocolate	678	1,458	1,212	2,226
	Green	563	907	1,087	2,051
	Cawnpore (ordinary variety) ...	1,065	1,706	1,964	2,379
	Canadian—				
	Polar six rowed	300	1,056	629	2,831
	Danish Chevalier	180	732	242	1,162
	Beardless	360	1,346	1,125	2,468
	Swedish	624	1,344	1,452	2,299
Oats ...	*Canadian—*				
	Prize Chester	240	1,128	520	2,142
	Canadian Triumph	246	1,050	787	2,527
	Reunie's Prize	198	942	472	1,966
	Welcome	240	756	708	2,367
	Bonanza	252	912	787	2,553
	White Egyptian	300	936	847	2,638
Rye grass ...	...	3,192	5,796	...	..
Lathyrus ...	...	Failed ..	...	...	.
English potatoes	Twenty varieties	Only one and in some cases two tubers of each variety were received. The tubers produced on the Station are very inferior to those imported. They have been carefully stored for trial in the next year.			

34. **Mixed crop.**—The following mixed crops were tried during the year. The fields in which they were sown were treated in the native way.

1. Indigo and maize.
2. Juár and arhar.
3. Bájra and arhar.
4. Cotton, castor, til and urd.
5. Cotton, arhar, til and urd.
6. Wheat and rape-seed.
7. Wheat and safflower.

The following figures show the outturn of each crop in the above mixtures :—

Mixture.	Individual crop.			Outturn per acre.		
Kharíf—				lbs.	lbs.	
Indigo-maize ...	Indigo	...	...	...	9,302	Green plant.
	Maize	...	Grain	42	1,906	Straw.
Juár-arhar ...	Juar	...	do.	682	8,571	do.
	Arhar	...	do.	686	1,670	do.
Bájra-arhar ...	Bájra	...	do.	85	1,488	do.
	Arhar	...	do.	210	734	do.
Cotton, castor, til and urd.	Cotton	...	Fibre	36	69	Seed.
	Castor	...	Seed	432	...	
	Til	...	do.	52	...	
	Urd	...	Grain	81	403	Straw.
Cotton, arhar, til and urd.	Cotton	...	Fibre	36	81	Seed.
	Arhar	...	Grain	1,396	4,110	Straw.
	Til	...	Seed	89	...	
	Urd	...	Grain	186	928	do.
Rabi—						
Wheat and rape-seed ...	Wheat	...	do.	770	1,565	do.
	Rape-seed	...	Seed	77	...	
Wheat and safflower ...	Wheat	...	Grain	872	1,771	do.
	Safflower	...	Flower	3	...	

35. **Rust.**—The object of the experiments made were twofold: (1) to decide whether the germs of rust fungi are inherent in the seed or float in the air and are propagated by atmospheric conditions suitable to their growth; (2) to ascertain whether pickling the seed with copper sulphate kills the germs supposed to be inherent in the seed. Small quantities of rust-infected grain of 7 varieties of wheat were sown in small beds and pots in duplicate. In one set of these, seed was sown after it was soaked in a solution of copper sulphate, and in the other seed was sown without any preliminary treatment. The seed germinated freely, but in February, when the winter rains arrived, rust appeared in all the beds and pots. Unfortunately the beds and pots all happened to be close to the canal distributary, where another field of wheat sown with uninfected seed was also attacked with rust. Thus the present year's experiment proves that pickling with copper sulphate is no preventive for rust; but the question whether the germs of rust fungi are inherent in the seed or float in the air still remains to be decided by future experiments.

36. The following appendices are attached to the present report :—

I.—A statement containing the results of all experiments tried at the Station during the ten years 1881-82 to 1890-91, with a table showing the character of rainfall in each year.

II.—Diagrams illustrating the results of some of the principal experiments tried during the last ten years.

III.—A map showing the position of the plots and fields in which experiments are conducted.

CAWNPORE :
The 6th July 1892.

L. P. BARMA,
Offg. Assistant Director.

APPENDIX I.

Table showing the character of rainfall at the Cawnpore Agricultural Experiment Station, during ten years 1881-82 to 1890-91.

Year.	Autumn. (Kharif.)	Winter. (Rabi).
1881-82.	Excessive in the beginning and scanty towards the end.	Almost *nil*.
1882-83.	Fairly good.	Very abnormal; a fall of about three inches happened on a single day accompanied by high winds.
1883-84.	Late and scanty.	No rain.
1884-85.	Heavy and inopportune.	Almost *nil*.
1885-86.	Ditto	Very favorable.
1886-87.	Fair in the beginning, with a long break in the middle and a severe hailstorm at the end.	Favorable.
1887-88.	Heavy and continuous.	Favorable.
1888-89.	Very heavy, nearly double the normal fall.	Rather heavy, with continuance of cloudy weather.
1889-90.	Very favorable.	Late and partial.
1890-91.	Rather heavy in the beginning, with a pretty long break in the middle, but on the whole not very prejudicial.	Heavy and accompanied by high winds.

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 to 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the unmanured plot in the series.	Remarks.
					Nitrogenous manures.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
I — Manure,	To determine the effect of nitrogenous and non-nitrogenous manures.	Maize ...	I.	1	Saltpetre 240 lbs per acre	...	2,190	1,068	1,608	871	907	Crops destroyed by rain.	Ditto.	1,041	1,186	1,267	559	In calculating the increase per acre of any plot over the unmanured plot the average outturn of the latter has been taken for the same years as of the plot whose outturn is compared.
				2	Cow dung 132 cwts. „	633	2,169	1,462	1,860	266	968			1,500	1,053	1,239	464	
				3	Sheep-dung 132 cwts. „	..	...	...	1,316	290	701			1,198	980	897	304	
				4	Poudrette 132 cwts. „	1,458	...	...	1,932	451	726			1,912	1,549	1,338	637	
					Nitrogenous and non-nitrogenous manures.													
				5	Saltpetre 240 lbs. and bone dust 360 lbs. per acre.	...	...	1,793	1,644	436	726			1,271	1,065	1,156	497	
				6	Saltpetre 240 lbs and bone superphosphate 240 lbs per acre.	...	...	1,385	1,260	520	847			1,246	1,367	1,104	445	
				7	Saltpetre 240 lbs. and ashes of 132 cwts. cow-dung per acre.	...	...	...	1,514	726	1,427			1,162	1,295	1,225	632	
				8	Cow-dung 132 cwts. and bone dust 360 lbs. per acre.	630	2,434	1,720	1,632	472	2,178			1,210	1,488	1,470	695	
				9	Cow dung 132 cwts. and gypsum 240 lbs. „	1,218	1,758	1,644	1,914	436	1,161			1,150	1,246	1,191	416	
				10	Sheep-dung 132 cwts and bone dust 360 lbs. „	...	...	1,798	1,518	508	774			1,827	1,670	1,349	690	
				11	Sheep-dung 132 cwts. and gypsum 240 lbs. „	...	...	1,485	1,360	330	847			1,706	1,113	1,140	481	
					Non-nitrogenous manures.													
				12	Ashes of 132 cwts. cow-dung per acre ...	723	1,452	1,073	1,230	327	580			895	1,016	912	137	
				13	Bone dust 360 lbs. „ ...	963	1,417	...	...	...	...			...	...	1,190	70	
				14	Bone superphosphate 240 lbs. per acre ...	213	1,422	...	...	...	...			...	...	817	420	
				15	Gypsum 240 lbs. per acre	1,038	1,056	...	...	...	...			...	...	1,047	—73	
				16	No manure	1,239	1,002	990	1,044	339	435			278	871	775	...	
					Nitrogenous manures.													
	Ditto ...	Do. ..	II	1	Saltpetre 240 lbs per acre	...	1,278	829	876	484	520	Crops destroyed by rain.	Ditto.	1,077	629	813	270	
				2	Cow-dung 132 cwts. „	...	2,020	1,170	1,580	605	665			1 573	653	1,181	638	
				3	Sheep-dung 132 cwts. „	...	...	...	1,168	847	726			1,270	1,561	1,114	699	
				4	Poudrette 132 cwts. „	...	...	...	1,728	859	1,161			1,379	1,936	1,413	998	
					Nitrogenous and non nitrogenous manures.													
				5	Saltpetre 240 lbs. and bone dust 360 lbs. per acre.	...	1,626	1,244	1,200	629	544			1,040	774	1,008	465	
				6	Saltpetre 240 lbs. and bone superphosphate 240 lbs. per acre.	...	...	1,048	852	762	520			1,222	1,367	962	482	
				7	Saltpetre 240 lbs. and ashes of 132 cwts. cow-dung per acre.	...	...	...	1,134	895	677			1,815	938	1,092	677	
				8	Cow-dung 132 cwts. and bone dust 360 lbs. per acre.	...	1,845	1,377	1,568	629	665			1,331	1,113	1,218	675	
				9	Cow-dung 130 cwts and gypsum 240 lbs. „	...	1,704	979	1,524	641	532			1,355	1,053	1,113	570	
				10	Sheep-dung 132 cwts. and bone dust 360 lbs. „	...	...	907	1,062	508	580			1,343	1,239	940	460	
				11	Sheep-dung 132 cwts. and gypsum 240 lbs. „	...	...	1,341	1,074	520	399			1,452	1,488	1,046	566	
					Non-nitrogenous manures.													
				12	Ashes of 132 cwts. cow-dung per acre ...	...	922	712	806	315	387			920	303	624	81	
				13	Bone dust 360 lbs. „ ...	...	844	...	...	...	...			...	...	844	— 80	
				14	Bone superphosphate 240 lbs. „ ...	...	1,378	...	...	...	...			...	...	1,378	454	
				15	Gypsum 240 lbs. per acre	...	912	...	...	...	...			...	...	912	— 12	
				16	No manure	...	924	802	564	194	205			302	811	543	...	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 years 1881-82 *to* 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the unmanured plot. in the series.	Remarks.
						Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
I.—Manure.	To determine the effect of nitrogenous and non-nitrogenous manures.	Wheat ...	III		*Nitrogenous manures.*													In calculating the increase per acre of any plot over the unmanured plot, the average outturn of the latter has been taken for the same years as of the plot whose outturn is compared.
				1	Saltpetre 240 lbs. per acre	1,242	1,978	1,355	1,324	1,712	1,234	1,161	1,137	1,646	1,440	1,423	439	
				2	Cow-dung 132 cwts. „	918	1,713	1,428	900	1,537	1,258	1,245	980	1,585	1,537	1,310	326	
				3	Sheep-dung 132 cwts. „	...	...	...	889	1,518	1,234	1,440	1,016	1,730	968	1,256	260	
				4	Poudrette 132 cwts. „	...	...	...	1,074	1,228	1,452	1,277	1,234	1,706	1,500	1,353	357	
					Nitrogenous and non-nitrogenous manures.													
				5	Saltpetre 240 lbs. and bone dust 360 lbs. per acre.	1,395	1,945	1,252	1.170	1,936	1,343	1,331	1,210	1,113	1,597	1,429	445	
				6	Saltpetre 240 lbs. and bone superphosphate 240 lbs. per acre.	...	...	1,984	1,509	1,098	1,198	1,113	738	1,585	1,648	1,359	359	
				7	Ditto 240 lbs. and ashesof 132 cwts. cowdung per acre.	...	...	...	1,149	968	1,162	1,912	847	1,343	1,404	1,255	259	
				8	Cow-dung 132 cwts and bone dust 360 lbs per acre	846	1,584	1,343	1,016	1,888	1,234	1,319	1,234	1,767	1,742	1,397	413	
				9	Cow-dung 132 cwts. and gypsum 240 lbs. „ ...	882	1,761	1,364	887	1,857	1,162	1,210	1,174	1,525	1,767	1,359	375	
				10	Sheep-dung 132 cwts. and bone dust 360 lbs. „ ...	...	...	1,143	826	1,416	1,689	956	968	1,513	1,718	1,204	204	
				11	Ditto 132 cwts. and gypsum 240 lbs „ ...	...	...	1,337	756	1,134	1,307	1,428	1,258	1,319	1,682	1,278	278	
					Non-nitrogenous manures.													
				12	Ashes of 132 cwts. cow-dung per acre ...	1,284	1,383	1,134	704	962	835	811	835	1,416	1,367	1,073	89	
				13	Bone dust 360 lbs per acre	1,287	1,033	...	...	...	...	...	...	...	...	1,160	239	
				14	Bone superphosphate 240 lbs. per acre ...	1,065	1,348	...	...	...	...	...	...	...	...	1,206	285	
				15	Gypsum 240 lbs. per acre	798	996	...	...	...	...	...	...	...	...	897	— 24	
				16	No manure	777	1,065	1,031	635	913	1,041	968	883	1,307	1,222	984	...	
	Ditto ...	Do. ...	IV		*Nitrogenous manures.*													
				1	Saltpetre 240 lbs. per acre	1,605	2,181	2,707	1,741	1,404	1,428	1,646	859	1,670	1,319	1,656	411	
				2	Cow-dung 132 cwts. „	738	1,623	3,031	1,466	2,021	1,270	1,222	992	2,856	1,779	1,700	455	
				3	Sheep-dung 132 cwts. „	...	...	...	1,448	1,984	1,742	1,234	1,125	1,488	1,791	1,545	345	
				4	Poudrette 132 cwts. „	...	...	...	1,492	1,803	1,966	1,307	1,646	2,045	1,972	1,746	546	
					Nitrogenous and non-nitrogenous manures.													
				5	Saltpetre 240 lbs. and bone dust 360 lbs. per acre.	1,575	2,056	2,901	1,624	2,093	1,561	2,505	847	2,239	1,742	1,914	669	
				6	Saltpetre 240 lbs. and bone superphosphate 240 lbs. per acre.	...	...	3,061	2,007	1,404	1,476	2,015	799	1,367	2,069	1,767	432	
				7	Saltpetre 240 lbs. and ashes of 132 cwts. cow-dung per acre.	...	...	...	1,586	1,573	1,996	998	871	1,428	1,670	1,446	246	
				8	Cow-dung 132 cwts. and bone dust 360 lbs. per acre.	678	1,401	2,874	1,516	1,561	1,754	992	871	1,634	1,718	1,500	255	
				9	Cow-dung 132 cwts and gypsum 240 lbs. per acre,	594	1,886	3,004	1,396	2,069	1,488	907	944	1,513	1,706	1,551	306	
				10	Sheep-dung 132 cwts. and bone dust 360 lbs. „	...	...	2,390	1,615	1,972	1,283	1,488	1,004	1,621	2,069	1,680	345	
				11	Sheep-dung 132 cwts. and gypsum 240 lbs per acre.	...	...	2,601	1,276	1,573	1,561	932	1,585	1,537	2,130	1,649	314	
					Non-nitrogenous manures.													
				12	Ashes of 132 cwts. cow-dung per acre ...	978	1,417	2,323	1,689	1,549	835	1,500	811	1,730	1,755	1,459	214	
				13	Bone dust 360 lbs. per acre	1,422	1,433	...	...	...	...	...	...	...	...	1,427	542	
				14	Bone superphosphate 240 lbs. per acre ...	1,170	1,271	...	...	...	...	...	...	...	...	1,220	335	
				15	Gypsum 240 lbs. per acre	912	1,152	...	...	...	...	...	...	...	...	1 032	147	
				16	No manure	771	999	2,281	1,025	1,119	1,258	907	617	1,876	1,597	1,245	...	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the unmanured plot in the series.	Remarks
						Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
I.—Manure,	Green soiling ...	Wheat ...	V	1	Indigo crop ploughed in, indigo was manured with gypsum 480 lbs. to the acre.	...	...	2,396	2,160	1,845	1,597	617	762	1,319	1,452	1,518	466	In calculating the increase per acre of any plot over the unmanured plot, the average outturn of the latter has been taken for the same years as of the plot whose outturn is compared.
				2	Green indigo ploughed in	...	...	2,358	1,944	1,494	1,270	920	714	1,670	1,984	1,544	492	
				3	Fresh indigo refuse 88 cwts. and lime 480 lbs. per acre,	...	...	2,336	1,581	1,379	1,452	1,488	1,428	1,742	1,742	1,643	591	
				4	Old indigo refuse 88 cwts per acre	...	...	2,580	1,430	1,313	1,307	1,379	1,295	1,912	1,742	1,620	568	
				5	Indigo water 3,600 cubic feet	...	...	2,060	934	1,113	738	865	726	1,222	1,016	1,084	32	
				6	Wheat sown after the crop of indigo was cut and removed.	...	...	1,590	1,107	1,791	1,283	1,379	835	1,484	1,136	1,326	274	
				7	Hemp ploughed in, hemp was manured with gypsum 480 lbs. to the acre.	...	...	2,260	1,476	1,083	1,319	871	835	1,452	944	1,280	228	
				8	Hemp ploughed in	...	...	...	1,399	1,138	871	907	1,028	1,972	1,125	1,206	220	
				9	Hemp water 3,600 cubic feet per acre	...	...	2,170	995	1,283	774	678	738	1,162	1,186	1,123	71	
				10	Wheat sown after the crop of hemp was removed ...	...	...	...	...	1,116	641	1,041	883	1,900	593	1,029	—17	
				11	No manure	...	...	1,515	623	1,367	847	786	653	1,464	1,162	1,052	...	
			VI	1	Fresh indigo refuse 88 cwts. and lime 480 lbs. per acre,	...	1,615	1,962	1,363	968	1,186	717	1,095	1,458	2,613	1,442	697	
				2	Fresh indigo refuse 88 cwts. per acre only ...	...	...	1,829	1,116	995	1,089	496	708	1,361	2,485	1,120	375	
				3	Old indigo refuse 88 cwts. and lime 480 lbs. per acre...	...	1,182	2,080	714	1,099	895	1,056	931	1,186	2,904	1,339	594	
				4	Old indigo refuse 88 cwts. per acre only ...	...	1,126	2,031	812	1,030	1,004	678	817	1,422	2,011	1,215	470	
				5	No manure	...	759	607	438	1,024	665	502	514	811	1,387	745	...	
			VII	1	Green manured with hemp	1 713	1,619	1,529	1,377	660	1,500	1,285	814	1,122	1,113	1,273	540	
				2	Green manured with hemp, which was treated with gypsum.	2,244	1,855	1,937	1,431	...	...	...	...	...	...	1,867	938	
				3	No manure	777	1,198	1,082	659	709	751	587	447	484	634	733	...	
	Experiment with certain combinations of mineral manures to discover the element in which the deficiency of the farm soil lies.	Ditto ...	VIII	1	Calcic superphosphate 180 lbs, ammonic chloride 138 lbs., potassic sulphate 90 lbs., and calcic sulphate 96 lbs. per acre.	2,142	1,726	1,777	1,459	1,416	...	...	...	...	...	1,704	902	
				2	All except calcic superphosphate	1,896	1,771	1,417	1,452	1,343	...	...	...	...	...	1,576	774	
				3	Ditto ammonic chloride	840	1,192	1,001	808	944	...	...	...	...	...	957	155	
				4	Ditto potassic sulphate	1,908	2,076	1,497	1,399	1,028	...	...	...	...	...	1,583	780	
				5	Ditto calcic sulphate	1,812	1,641	1,323	1,210	774	...	...	...	...	...	1,352	550	
				6	No manure	858	1,045	762	757	587	...	...	...	...	...	802	...	
	To determine the effect of certain animal excrements, woollen refuse and saltpetre on maize.	Maize ...	IX	1	Woollen refuse 88 cwts. per acre	...	...	...	1,604	1,186	2,009	1,815	Crop destroyed.	2,226	2,505	1,891	1,273	
				2	Sheep-dung 88 cwts. „	...	...	...	924	780	1,985	1,210		1,573	1,609	1,347	729	
				3	Cow-dung 88 cwts. „	...	...	...	1,128	780	1,258	302		1,488	1,174	1,022	404	
				4	Poudrette 88 cwts. „	...	...	...	1,560	847	2,009	907		1,694	1,742	1,490	872	
				5	Horse-dung 88 cwts. „	...	...	...	1,104	968	1,331	605		1,331	1,367	1,118	500	
				6	Pigs' droppings 88 cwts. „	...	...	...	918	1,016	1,270	1,210		1,150	992	1,093	475	
				7	Potassic nitrate 240 lbs. „	...	...	...	780	1,317	1,270	460		1,355	605	963	345	
				8	No manure	...	...	...	684	581	1,222	145		968	10[illegible]	618	...	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1899-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the unmanured plot.	Remarks.
						Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
I.—Manure...	To determine the value of cotton seed and certain oil-cakes as manure and of the dung obtained from cattle fed on them against the dung obtained from cattle to whom no consolidated food is given.	Wheat ...	XA	1	Mustard cake 400 lbs. per acre ...	...	...	...	...	1,779	1,209	1,024	1,027	1,178	...	1,243	241	
				2	Ditto 800 lbs. „ ...	...	...	...	...	1,391	1,304	1,297	1,260	1,391	...	1,329	327	
				3	Ditto 1,600 lbs. „ ...	...	...	...	...	1,851	...	...	...	...	...	1,851	363	
				4	Cake fed dung 36 cwts. „ ...	...	...	...	...	1,041	1,391	862	893	1,157	...	1,069	67	
				5	Ditto 72 cwts. „ ...	...	...	...	...	1,984	1,486	846	813	949	...	1,2'6	214	
				6	Ditto 146 cwts. „ ...	...	...	...	...	1,851	...	...	...	..	...	1 851	363	
				7	Cow-dung 146 cwts per acre, obtained from cattle which had not received any cake, or other nutritious food.	...	...	...	...	998	1,438	973	1,220	1,242	...	1,174	172	
				8	No manure	...	...	...	...	1,488	1,019	743	807	954	...	1,002	...	
			XB	1	Cotton seed fed dung 36 cwts. per acre ...	...	...	...	...	1,149	1,051	854	981	1,120	...	1,031	—76	
				2	Ditto 72 cwts. „ ...	...	...	...	...	1,113	1,019	1,155	1,044	1,340	...	1,134	27	
				3	Ditto 146 cwts. „ ...	...	...	...	...	2,057	269	...	...	...	...	1,163	—104	
				4	Perished cotton seed 400 lbs. „ ...	...	...	...	...	1,476	814	815	1,107	1,270	...	1,096	– 11	
				5	Ditto 800 lbs. „ ...	...	...	...	...	2,722	1,185	1,186	1,281	1,213	...	1,517	410	
				5	Ditto 1,600 lbs. „ ...	...	...	...	...	1,984	...	...	...	...	...	1,984	351	
				7	Cow-dung 146 cwts. per acre, obtained from cattle which had not received any cake or other nutritious food.	...	...	...	...	998	774	894	1,170	1,360	...	1,039	—68	
				8	No manure	...	...	...	...	1,633	901	751	1,091	1,160	...	1,107	...	
			XC	1	Castor cake 400 lbs. per acre ...	...	...	...	...	1,682	...	...	...	...	...	1,682	133	
				2	Ditto 800 lbs. „ ...	...	...	...	...	1,745	...	...	...	...	...	1,745	196	
				3	Ditto 1,600 lbs. „ ...	...	...	...	...	990	...	...	...	...	...	990	—559	
				4	Cow-dung 36 cwts. „ ...	...	...	...	...	1,307	...	...	...	...	...	1,307	—242	
				5	Ditto 72 cwts. „ ...	...	...	...	...	1,537	...	...	...	...	...	1,537	—12	
				6	Ditto 146 cwts. „ ...	...	...	...	...	998	...	...	...	...	...	998	—551	
				7	No manure	...	...	...	...	1,549	...	...	...	...	...	1,549	...	
	To determine the residual value of certain manures.	Ditto ...	XI	1	Cow-dung 220 cwts. per acre ...	...	...	...	...	949	...	1,210	1,028	856	1,312			The manures mentioned in column 6 were applied in the year 1885-86 only.
				2	Poudrette 146 cwts. „ ...	...	...	...	...	1,202	...	987	847	688	936			
				3	Oilcake 220 cwts. „ ...	...	...	...	...	810	...	714	774	664	860			
				4	Woollen refuse 88 cwts. „ ...	...	...	...	...	925	...	750	678	656	957			
				5	Cow-dung and bone dust 145 cwts. per acre...	...	...	...	...	1,054	...	702	714	704	860			
				6	Compost 220 cwts. per acre ...	...	...	...	...	574	...	702	690	648	946			
				7	Green manured with mustard ...	...	...	...	...	...	...	617	665	632	968			
				8	Saltpetre 240 lbs. per acre ...	...	...	...	...	968	...	629	714	744	1,022			
				9	Ammonic chloride 240 lbs. per acre ...	...	...	...	...	905	...	690	702	736	979			
				10	No manure	...	...	...	...	1,192	...	581	871	744	936			
			XII	1	Calcic superphosphate 180 lbs., ammonic chloride 138 lbs., potassic sulphate 90 lbs. and calcic sulphate 96 lbs. per acre.	...	...	...	...	1,416	...	...	653	968	847			
				2	All except calcic superphosphate ...	...	...	...	...	1,343	...	...	581	823	895			
				3	Ditto ammonic chloride ...	...	...	...	...	944	...	...	629	943	1,041			
				4	Ditto potassic sulphate ...	...	...	...	...	1,028	...	...	678	871	1,016			
				5	Ditto calcic sulphate ...	...	...	...	...	774	...	...	508	702	678			
				6	No manure	...	...	...	...	587	...	...	605	744	847			

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment..	Outturn per acre in lbs. 1881-82.	1882-83	1883-84	1884-85	1885-86	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the unmanured plot	Remarks.
													Fibre.	Fibre	Fibre.	Fibre.	Fibre.	
1.—Manure.	To determine the effect of kainit applied with other manures.	Cotton ...	XIII	1	Fresh silt from canal 366 cwts. per acre,	...	...	...	...	...	...	..	169	121	150	147	47	
				2	Kainit 320 lbs. and gypsum 320 lbs. per acre.	...	...	...	...	...	...	...	181	97	203	160	60	
				3	Farmyard manure 132 cwts. and gypsum 110 lbs. per acre.	...	...	...	...	...	...	...	218	73	218	173	73	
				4	Ditto ditto and kainit 110 lbs. per acre.	...	...	...	...	...	...	...	230	97	230	186	86	
				5	Woollen refuse 88 cwts. per acre ..	...	...	...	...	...	...	...	290	183	263	245	145	
				6	No manure	...	...	...	...	...	...	...	145	61	94	100	...	
													Grain.	Grain	Grain.	Grain.	Grain.	
		Wheat ...	XIV	1	Kainit 3 cwts per acre and green hemp ploughed in.	...	...	...	...	...	...	...	1,065	1,839	847	1,250	270	
				2	Hemp ploughed in	...	...	...	...	...	...	...	968	1,779	895	1.214	234	
				3	Farmyard manure 146 cwts. and kainit 3 cwts per acre.	...	...	...	...	...	...	...	1,681	1,402	1,548	1,544	564	
				4	Farmyard manure 146 cwts. per acre ...	...	...	...	...	...	...	...	...	1,463	1,783	1,623	528	
				5	Woollen refuse 146 cwts and kainit 3 cwts. per acre.	...	...	...	...	...	...	...	1,812	1,227	1,468	1,502	522	
				6	Woollen refuse 146 cwts. per acre ...	...	...	...	...	...	...	...	...	1,436	1,694	1,565	470	
				7	No manure	...	...	...	...	...	...	...	750	1,150	1,041	980	...	
												Plant.	Plant	Plant	Plant.	Plant.	Plant.	
	To determine the effect of gypsum on leguminous crops.	Indigo ...	XVA	1	Gypsum 240 lbs. per acre, applied at the time of sowing.	...	...	...	...	...	...	14,487	7,690	14,387	5,953	10,629	2,539	
				2	Gypsum 240 lbs. per acre applied as a top-dressing when the plants were 6 inches high	...	...	...	...	...	...	...	6,697	11,906	5,457	8,020	1,553	On the average of three years' figures.
				3	No manure	...	...	...	...	...	...	12,960	5,953	9,178	4,271	8,090	...	
													Grain.	Grain.	Grain.	Grain.	...	
		Peas ...	XVB	1	Farmyard manure 36·5 cwts. and gypsum 3 cwts. per acre.	...	...	...	...	...	...	...	1,703	310	549	854	...	
				2	Ditto 78 cwts. only per acre,	...	...	...	...	...	...	...	1,673	247	322	747	...	
		Gram ...	XVC	1	Farmyard manure 36·5 cwts. and gypsum 3 cwts per acre.	...	...	...	...	...	...	...	1,680	1,332	1,742	1,585	...	
				2	Ditto 73 cwts. only per acre,	...	...	...	...	...	...	...	1,508	1,068	1,215	1,264	...	
								Grain.	Grain.	Grain.	Grain	Grain.	Grain.	Grain.	Grain.	Grain	Grain.	
	Miscellaneous ...	Wheat ...	XVI	1	Brick-kiln refuse 88 cwts. per acre ...	...	...	2,598	1,176	1,053	799	472	641	1,113	629	1,060	301	
				2	Silt 219 cwts. per acre	...	...	1,322	1,059	1,065	762	566	690	1,065	956	936	177	
				3	Compost 146 cwts. per acre ...	...	...	...	...	968	774	693	835	1,210	1,476	993	404	
				4	Road scraping 219 cwts per acre ...	...	...	...	...	968	1,041	732	738	980	799	876	287	
				5	Ashes of 132 cwts. weeds per acre ...	...	...	1,760	1,083	1,001	387	678	557	641	1,416	940	181	
				6	Ashes of 132 cwts. weeds and saltpetre 240 lbs. per acre.	...	...	2,184	1,303	1,246	629	508	1,028	1,029	762	1,086	327	
				7	Ammonic chloride 240 lbs. per acre ...	...	...	2,005	1,448	1,219	738	363	557	629	460	927	168	
				8	No manure	...	...	1,652	880	838	448	351	593	605	702	759	...	
													Bulbs.	Bulbs.	Bulbs.	Bulbs.	Bulbs.	
		Potatoes ...	XVII	1	Poudrette 146 cwts. and sulphate of iron ½ cwts. per acre.	...	...	...	...	...	...	...	11,613	10,486	15,379	12,493	2,590	Increase over the plot treated with cow-dung.
				2	Woollen refuse 146 cwts. and gypsum 3 cwts. per acre.	...	...	...	...	...	...	...	10,933	11,074	13,757	11,921	2,018	
				3	Poudrette 146 cwts. and kainit 5 cwts. per acre.	...	...	...	...	...	...	...	6,133	9,454	14,883	10,157	254	
				4	Castor cake 800 lbs. and gypsum 3 cwts. per acre.	...	...	...	...	...	...	...	8,567	9,436	17,642	11,822	1,919	
				5	Cow-dung 146 cwts. per acre ...	...	...	...	...	...	...	..	6,626	8,552	14,532	9,903	...	

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Statements showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

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Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs.	Remarks.
						Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	Fibre.					Fibre.	Fibre.	
II —Ploughing.	To determine the effect of deep and shallow ploughing.	Cotton ...	I	1	Ploughed with the native plough	177	98	120	40	195	36	...	...	...	...	111	...	
				2	Ditto with Watt's or Kaisar Plough, which goes to a depth of 5″; the number of ploughings being only half that of plot I.	153	112	141	48	226	55	...	...	...	...	122	11	Increase compared with the plot ploughed with the native plough.
				3	Ploughed with Collin's Plough, which goes to a depth of 9″; the number of ploughings being only half that of plot I.	...	105	136	61	210	75	...	...	...	...	117	19	
			II	1	Ploughed with the native plough	...	...	93	31	218	30	...	...	...	...	93	...	
				2	Ploughed with Watt's or Kaisar Plough, which goes to a depth of 5″; the number of ploughings being only half that of plot I.	...	...	105	35	223	31	...	...	...	...	98	5	Ditto.
				3	Ploughed with Collin's Plough, which goes to a depth of 9″; the number of ploughings being only half that of plot I.	...	...	115	37	224	34	...	...	...	...	102	9	
							Grain.	Grain.	Grain.	Grain.	Grain.		Grain.	Grain.	Grain.	Grain.	Grain.	
	Ditto ...	Wheat ...	III	1	Ploughed with the native plough	...	586	467	534	415	392	...	726	653	702	559	...	
				2	Ploughed with Watt's or Kaisar Plough, which goes to a depth of 5″; the number of ploughings being only half that of plot I.	...	775	679	850	210	468	...	823	694	807	663	104	Ditto.
				3	Ploughed with Collin's Plough, which goes to a depth of 9″; the number of ploughings being only half that of plot I.	...	1,036	1,226	721	258	597	...	984	920	1,000	843	284	
			IV	1	Ploughed with the native plough	...	...	728	427	335	128	...	731	1,134	1,566	721	...	
				2	Ploughed with Watt's or Kaisar Plough, which goes to a depth of 5″; the number of ploughings being only half that of plot I.	...	...	1,006	546	415	245	...	842	1,618	1,596	895	174	Ditto.
				3	Ploughed with Collin's Plough, which goes to a depth of 9″; the number of ploughings being only half that of plot I.	...	...	1,304	736	413	563	...	725	1,418	1,332	927	206	
						Fibre.	Fibre.									Fibre.	Fibre	
	To determine the effect of early and late ploughing.	Cotton ...	V	1	Early ploughed	252	165	...	...	...	...	...	...	...	...	208	58	Compared with the plot ploughed late.
				2	Late ploughed	153	148	...	...	...	...	...	...	...	...	150	...	
						Grain.	Grain.	Grain.	Grain.	Grain	Grain.					Grain	Grain	
III —Irrigation.	To determine the relative merits of canal and well water.	Wheat ...	IA	1	Irrigated from well	1,312	1,381	864	1,028	399	1,041	...	...	...	...	1,004	200	Increase compared with the plot watered from canal.
				2	Ditto canal	1,109	1,227	720	641	436	690	...	...	...	...	804	...	
			IB	1	Ditto well	...	...	1,824	1,205	1,036	...	...	...	...	...	1,355	191	Ditto.
				2	Ditto canal	...	...	1,579	916	998	...	...	...	...	...	1,164	...	
	To ascertain the effect of irrigation in increasing the outturn.	...	II	1	Ditto once	696	412	769	599	762	762	...	...	...	...	667	180	Increase over the unirrigated plot.
				2	Ditto twice	513	481	815	662	835	968	...	...	...	...	712	225	
				3	Ditto thrice	921	651	846	951	841	1,065	...	...	...	...	879	392	
				4	Ditto four times	1,104	698	998	1,016	865	1,246	...	...	...	...	988	501	
				5	Ditto five „	1,209	...	1,252	1,125	968	1,367	...	...	...	...	1,185	672	
				6	Unirrigated	513	330	360	302	641	750	...	...	...	...	487	...	

Statement showing results of experiments treid at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

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Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Special treatment.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs.	Remarks.
												Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
IV.—Sowing,	To determine the merits of early and late sowing.	Maize ...	I.	1	Early	...	...	...	...	...	...	734	1,183	2,882	579	1,344	281	On the late sown plot.
				2	Late	...	...	...	...	...	...	810	1,033	1,953	458	1,063	...	
											Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	
		Cotton ...	II.	1	Early	...	...	...	...	...	84	121	97	180	175	131	52	Ditto.
				2	Late	...	...	...	...	...	59	108	24	150	55	79	...	
							Fibre.	Fibre.	Fibre.	Fibre.								
Ditto ...	To determine the merits of sowing cotton in lines, on ridges and broadcast.	Cotton (country).	III A.	1	Broadcast	...	138	81	75	219	...	...	...	...	...	128	...	On the plot sown broadcast.
				2	In lines	...	190	54	54	75	...	...	...	...	...	93	−35	
				3	On ridges at the top	...	...	70	62	132	...	...	...	...	...	88	−37	
				4	On ridges at the side	...	...	62	58	124	...	...	...	...	...	81	−44	
		Cotton (Exotic).	III B.	1	Broadcast	...	...	81	50	116	...	...	...	...	...	82	...	Ditto.
				2	In lines	...	...	92	35	116	...	...	...	...	...	81	−1	
				3	On ridges at the top	...	...	96	46	128	...	...	...	...	...	90	8	
				4	On ridges at the side ...	...	...	97	37	135	..	...	...	...	...	90	8	
										Grain.	Grain.		Grain.	Grain.		Grain.	Grain.	
Ditto ...	To determine the merits of sowing maize after the American and Indian fashion.	Maize ...	IV.	1	Sown after the American fashion but only ... 1′ apart,	...	...	...	...	...	...	...	600	2,308	...	1,450	380	On the plot sown in the native way.
				2	Ditto ditto ... 2′ „	...	...	...	...	2,187	790	...	416	2,108	...	1,375	−203	
				3	Ditto ditto ... 3′ „	...	...	...	...	2,207	597	...	300	1,876	...	1,245	−333	
				4	Ditto ditto .. 4′ „	...	...	...	...	572	241	...	...	...	...	406	−1,680	
				5	Sown behind plough in the native way.	...	...	...	...	2,845	1,328	...	500	1,640	...	1,578	...	
												Juice.	Juice.	Juice.	Juice.	Juice.	Juice.	
Ditto ...	To determine the merits of sowing cane as done in the West Indies against the method followed in the North-Western Provinces and Oudh.	Sugar-cane ...	V,	1	Sown after the West Indies fashion,	...	...	...	...	...	...	8,459	7,596	7,562	5,917	7,383	−2,287	Ditto.
				2	Sown in the ordinary way followed in the North-Western Provinces and Oudh.	...	...	...	...	...	...	11,118	8,836	11,273	7,453	9,670	...	
						Grain.	Grain.	Grain.	Grain.	Grain.			Grain.	Grain.	Grain.	Grain.	Grain.	
Ditto ...	To determine the effect of thin *versus* thick sowing.	Wheat ...	VI.	1	Sown in every furrow (as usually done).	1,978	1,595	...	...	...	...	...	...	...	...	1,786	...	On the plot sown in the usual way.
				2	Ditto 2nd furrow „ ...	...	1,268	...	...	...	...	...	...	...	...	1,268	−327	
				3	Ditto 3rd furrow „ ...	...	1,355	...	...	...	...	...	...	...	...	1,355	−240	
				4	Dibbled in by hand in little holes made with the finger 6″ apart in lines made 1 foot apart.	1,986	884	...	...	...	...	...	...	...	...	1,435	−351	
Ditto ...	Sowing in raised beds with alternate depressed fallow beds according to Jethro Tull or Lois Weeden's system against the ordinary way of sowing behind the plough.	Ditto ...	VII.	1	Tull's system	...	...	988	667	614	...	...	537	850	...	731	−386	Ditto.
				2	Ordinary way	...	...	1,376	952	780	...	...	1,052	1,423	...	1,117	...	
									Cwts.							Cwts.	Cwts.	
Ditto ...	To determine the merits of sowing root crops on ridges and on flat land.	Carrots ...	VIII A.	1	Sown on ridges	...	...	...	185	...	...	...	...	...	...	185	28	Ditto.
				2	Ditto flat ground	...	...	...	157	...	...	...	...	...	...	157	...	
		Mangold ...	VIII B.	1	Sown on ridges	...	...	...	62	...	...	...	...	...	...	62	8	Ditto.
				2	Ditto flat ground	...	...	...	54	...	...	...	...	...	...	54	...	
		Italian turnips,	VIII C.	1	Sown on ridges	...	...	...	46	...	...	...	...	...	...	46	8	Ditto.
				2	Ditto flat ground	...	...	...	38	...	...	...	...	...	...	38	...	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

Class.	Experiment.	Crop on which tried.	Series.	Serial number.	Variety.	Outturn per acre in lbs. 1881-82	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Increase per acre in lbs. over the local variety.	Remarks.
						Fibre.	Fibre.	Fibre.		Fibre.		Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	Fibre.	
V—Seed ...	To determine the relative merits of the different varieties of seed	Cotton ..	I.	1	New Orleans	185	130	95	...	98	...	121	..	...	.	126	—12	Increase calculated on the average of 5 years.
				2	Upland Georgian	115	...	...	...	78	...	...	138	160	103	119	15	Ditto.
				3	Louisiana	...	...	...	...	93	...	...	97	194	126	127	23	Ditto 4 years
				4	De la Louisiana	...	...	...	...	89	...	...	...	...	...	89	—8	Ditto 1 year.
				5	S B Mexcy	...	...	...	...	...	...	...	24	180	60	88	—19	Ditto 3 years.
				6	Shine's Early Prolific	...	...	...	...	...	...	...	24	140	40	68	—39	Ditto.
				7	Jones' Improved	...	...	...	...	...	...	...	24	180	60	88	—19	Ditto.
				8	Sea Island	...	...	...	...	...	...	...	97	194.	91	127	20	Ditto.
				9	Hybrid	...	...	...	...	...	...	...	83	183	103	123	16	Ditto.
				10	Egyptian	...	...	...	...	...	...	...	97	194	80	124	17	Ditto.
				11	Nankin	...	..	90	...	80	...	106	...	...	...	92	5	Ditto.
				12	Tree Cotton	...	...	...	...	...	...	...	111	148	115	125	18	Ditto.
				13	Garo Hills	...	...	...	...	...	...	...	166	194	91	150	43	Ditto.
				14	Hinganghát	108	...	...	...	82	...	...	111	183	103	117	—17	Ditto 5 years
				15	Kulpahar	161	...	...	...	...	...	...	...	.	...	161	—91	Ditto 1 year.
				16	Cawnpore	252	179	67	...	97	...	97	81	180	60	126	...	
												Juice.	Juice.	Juice.	Juice.	Juice.	Juice.	
		Sugar-cane,	II.	1	Dhaul (from Behea)	...	...	...	...	...	...	10,524	5,401	7,894	9,928	8,437	—1,005	
				2	Dikchan (from Sháhjahánpur) ...	...	...	...	...	...	...	3,710	8,896	9,322	11,601	8,382	—1,060	
				3	Baraúkhá (from Moradabad)	...	...	...	...	...	...	9,147	7,550	8,797	5,655	7,787	—1,655	
				4	Matua (from Cawnpore)	...	...	...	..	...	...	15,773	7,828	7,781	6,386	9,442	...	
									Grain.							Grain.	Grain.	
		Maize ...	III.	1	Káshipur	...	...	...	3,853	...	...	...	...	...	...	3,853	2,184	
				2	Jaunpur	...	...	...	2,642	...	...	...	... .	...	...	2,642	973	
				3	Cawnpore	...	...	...	1,669	...	...	...	...	...	...	1,669	...	
					Indian wheats	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
		Wheat ...	IVA.	1	Muzaffarnagar, soft white wheat ...	1,757	1,623	...	1,808	1,595	...	...	1,070	2,272	...	1,687	498	
				2	Mundia, a soft white variety of Cawnpore...	...	...	...	...	1,616	...	1,132	956	1,052	...	1,189	...	
				3	Gajaria, a soft red variety of Unao	...	...	...	...	1,422	...	...	...	...	...	1,422	233	
				4	Kathia, a hard red variety of Bundelkhand,	...	...	...	...	378	..	...	...	...	...	378	—811	
				5	Buxar, a soft white wheat of Bengal ..	...	...	...	...	...	1,361	1,061	702	1,465	...	1,147	—42	
				6	Sindhi, a hard white wheat from Sindh ...	...	...	...	...	...	...	768	847	1,007	...	874	—315	
					English and Australian wheats.													
			IVB	1	English, Rough chaff	114	472	...	...	...	...	...	...	...	...	293	—896	
				2	English, Red bearded	283	..	...	...	...	...	...	...	458	...	370	—819	
				3	Adelaide (Australian wheat)	...	...	...	452	...	...	...	871	1,155	...	826	—363	
					Canadian wheats.													
			IVC	1	Ladoga	...	...	...	...	...	...	...	...	...	581	581	—608	
				2	Red Fern	...	...	...	...	...	...	...	...	...	97	97	—1,092	
				3	Judket	...	...	...	...	...	...	...	...	...	315	315	—874	
				4	White Fife	...	...	...	...	...	...	...	...	...	194	194	—995	
				5	Red Fife	...	...	...	...	...	...	...	...	...	133	133	—1,056	
				6	Saponka	...	...	...	...	...	...	...	...	...	145	145	—1,044	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

Class.	Experiment.	Crop on which tried	Series.	Serial number.	Variety.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89.	1889-90.	1890-91	Average outturn per acre in lbs.	Increase per acre in lbs. over the local variety.	Remarks.
					Indian barleys.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	Grain	
V—Seed,	To determine the relative merits of different varieties of seed.	Barley ...	VA. ...	1	Cawnpore barley, an ordinary variety of the North-Western Provinces.	1,591	2,018	2,465	2,165	1,577	...	1,974	1,974	1,949	...	1,964	..	
				2	Rasuli, naked or huskless barley of Kotgarh,	820	1,121	1,760	787	538	...	574	1,780	1,362	...	1,093	—871	
				3	Chocolate colored barley	...	...	...	...	1,109	...	507	1,547	1,684	...	1,212	—656	
				4	Green huskless barley	...	...	...	...	...	...	840	1,312	1,110	...	1,087	—879	
					English barleys.													
			VB. ...	1	Golden melon	1,000	1,248	1,751	1,075	...	...	...	...	...	...	1,268	—792	
				2	Beardless	803	883	1,438	467	...	...	...	...	...	...	898	—1,162	
				3	Peerless	741	1,112	1,246	609	...	...	...	...	...	...	927	—1,133	
				4	Chevalier	...	...	...	1,676	...	...	...	...	...	...	1,676	—489	
					Canadian barleys.													
			VC. ...	1	Polar six rowed	...	...	...	...	...	...	...	...	...	629	629	—1,335	
				2	Danish Chevalier 2 rowed	...	...	...	...	...	...	...	...	...	242	242	—1,722	
				3	Beardless ditto	...	...	..	...	...	...	...	...	...	1,125	1,125	—839	
				4	Swedish ditto	...	...	...	...	...	...	...	...	...	1,452	1,452	- 512	
	Ditto ...	Gram ...	VI ...	1	White	602	659	...	...	...	...	...	...	...	...	630	—782	
				2	Black	1,249	492	...	...	...	...	...	...	...	...	870	—542	
				3	Common red variety	1,862	963	...	...	...	...	...	...	..	...	1,412	...	
					Cape and English oats.													
	Ditto ...	Oats ...	VIIA. ...	1	Cape oats	1,706	2,026	2,507	2,146	1,619	...	...	...	...	...	2,001	...	
				2	English, black Tartary	87	..	...	...	...	...	...	...	...	...	87	...	
				3	English, Lincolnshire Poland	208	...	...	...	...	...	...	...	...	...	208	...	
				4	English, early blossom	102	...	...	...	...	...	...	...	...	...	102	...	
					Canadian oats.													
			VIIB. ..	1	Prize Chester	...	...	...	...	...	...	...	...	...	520	520	...	
				2	Canadian Triumph	...	...	...	...	...	...	...	...	...	787	787	...	
				3	Rennie's prize	...	...	...	...	...	..	...	...	...	472	472	...	
				4	Welcome	...	...	...	...	...	...	...	...	...	708	708	...	
				5	Bonanza	...	...	...	...	...	...	...	...	...	787	787	...	
				6	White Egyptian	...	..	...	...	...	...	...	...	...	847	847	...	
	Ditto ..	Linseed ...	VIII ...				Seed.	Seed.	Seed.							Seed.	Seed.	
				1	Red, an ordinary variety of the N.-W. P. ...	...	336	...	...	...	...	...	..	...	...	336	...	
				2	White variety from Malwa	...	319	625	...	...	...	...	...	...	...	472	—17	
				3	Riga linseed	...	...	775	...	...	...	...	...	...	...	775	439	
		Rapeseed...	IX ...	1	Ordinary Cawnpore variety	...	...	...	531	...	...	...	...	...	...	531	...	
				2	German rapeseed	...	...	...	433	...	...	...	...	...	...	433	—98.	
									Root.							Root.	Root	
		Carrot ...	X ..	1	Belgium	...	...	...	96 cwts.	...	...	...	...	...	...	96 cwts.	—125 cwts.	
				2	Country	...	...	...	221 cwts.	...	...	...	...	...	...	221 cwts.	...	
		Mangold ...	XI ...	1	English, golden tankard	...	...	...	68 cwts.	204 cwts.	...	...	...	...	...	136 cwts.	...	
		Turnips ...	XII .	1	Italian	...	...	...	42 cwts.	...	...	...	...	...	...	42 cwts.	...	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

Class.	Experiment.	Treatment	Series.	Serial number.	Crops.	Outturn per acre in lbs. 1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88	1888-89.	1889-90.	1890-91.	Average outturn per acre in lbs.	Remarks.
							Grain.	Grain.	Grain.	Grain.			Grain.	Grain.	Grain.	Grain.	
VI—Indigenous crops.	To determine the outturn of indigenous crops.	Cultivated in the native way	I.		1. *Cereals*—												
				1	Wheat (Triticum sativum)	...	1,000	1,044	882	...	..	...	...	...	...	975	
				2	Barley (Hordeum vulgare)	...	...	1,458	1,412	...	...	...	...	...	...	1,435	
				3	Rice (Oryza Sativa)	...	...	...	.	...	...	...	...	...	...	...	
				4	Maize (Zea Mays)	...	1,585	1,226	1,452	436	...	...	...	889	962	1,092	
				5	Juar (Sorghum vulgare)	...	...	...	548	199	...	...	423	1,029	605	561	
				6	Bajra (Pennisetum typhoideum)	...	...	...	591	169	...	...	121	461	121	293	
				7	Mandua (Eleusine coracana)	...	...	...	609	460	...	...	...	605	496	542	
				8	Kodon (Paspalum scrobiculatum)	...	...	...	657	151	...	...	206	339	339	338	
				9	Sawan (Panicum frumentaceum)	...	...	...	273	508	...	...	...	...	...	390	
				10	Kakun (Sclaria italica)	...	...	...	623	290	...	...	...	...	...	456	
			II.		2. *Pulses*—												
				1	Gram (Cicer arietenum)	...	...	...	961	...	...	...	...	...	...	961	
				2	Peas (Pisum sativum)	...	...	...	1,205	...	...	...	...	...	...	1,205	
				3	Masur (Ervum lens)	...	...	...	655	...	...	...	...	...	...	655	
				4	Chatar (Lathyrus Sativus)	...	...	...	1,623	...	...	...	...	..	...	1,623	
				5	Arhar (Cajinus indicus)	...	...	...	522	...	...	...	436	738	...	565	
				6	Urd (Phaseolus Roxburghii)	...	...	...	402	121	...	...	73	194	206	199	
				7	Mung (Phaseolus mungo)	...	...	...	141	375	...	...	121	157	133	185	
				8	Moth (Phaseolus aconitifolius)	...	...	...	159	218	...	...	799	121	182	296	
				9	Lobia (Vigna catiang)		...	...	576	381	...	...	315	726	73	414	
				10	Khurthi (cyamopsis psoralioides)	...	...	...	...	...	...	...	1,718	363	665	915	
				11	Bhatwans (not known)	...	...	...	...	865	...	...	...	...	...	865	
			III.		3. *Oilseeds*—				Seed.	Seed.				Seed.	Seed.	Seed.	
				1	Linseed (Linum usitatissimum)	...	...	...	342	...	...	...	...	...	...	342	
				2	Rapeseed (Brassica Campestris)	...	...	...	531	...	...	...	...	...	..	531	
				3	Lahi (Brassica Juncea)	...	...	...	666	...	...	...	...	...	...	666	
				4	Sehuan (Eruca Sativa)	...	...	...	817	...	...	...	...	...	. .	817	
				5	Til (Sesamum Indicum)	...	...	...	...	180	...	...	...	121	109	137	
				6	Castor (Ricinus communis)	...	...	...	1,113	...	...	...	...	303	...	708	
			IV.		4. *Sugar*—												
				1	Sugarcane (Saccharum officinarum) ...	...	...	...	...	...	...	...	...	...	...	...	
				2	Sorghum (Sorghum saccharatum)	...	...	...	...	...	...	...	...	...	...	...	
			V.		5. *Fibres*—		Fibre.	Fibre.	Fibre.	Fibre		Fibre.	Fibre.	Fibre.	Fibre	Fibre.	
				1	Cotton (Gossypium sp)	...	179	67	...	97	...	97	81	180	60	109	
				2	Sanai (Crotalaria Juncea)	...	...	...	548	...	...	...	290	557	750	536	
				3	Patsan (Hibiscus cannabinus)	...	...	...	348	...	...	...	...	...	...	348	
			VI.	...	6. *Dyes*— Indigo (Indigo fera tinctoria)	...	...	...	...	...	...	...	...	...	Plant. 11,922	Plant. 11,922	
			VII.	...	7. *Drugs*— Poppy (Papaver somniferum)	...	...	...	...	...	...	...	Opium. 15	Opium 10	...	Opium 12·5	

Statement showing results of experiments tried at the Agricultural Experiment Station, Cawnpore, during the 10 *years* 1881-82 *to* 1890-91.

N.B.—Except the special treatment noted in column 6, the treatment of every plot in each series in regard to ploughing, weeding, watering, manure and seed was exactly similar.

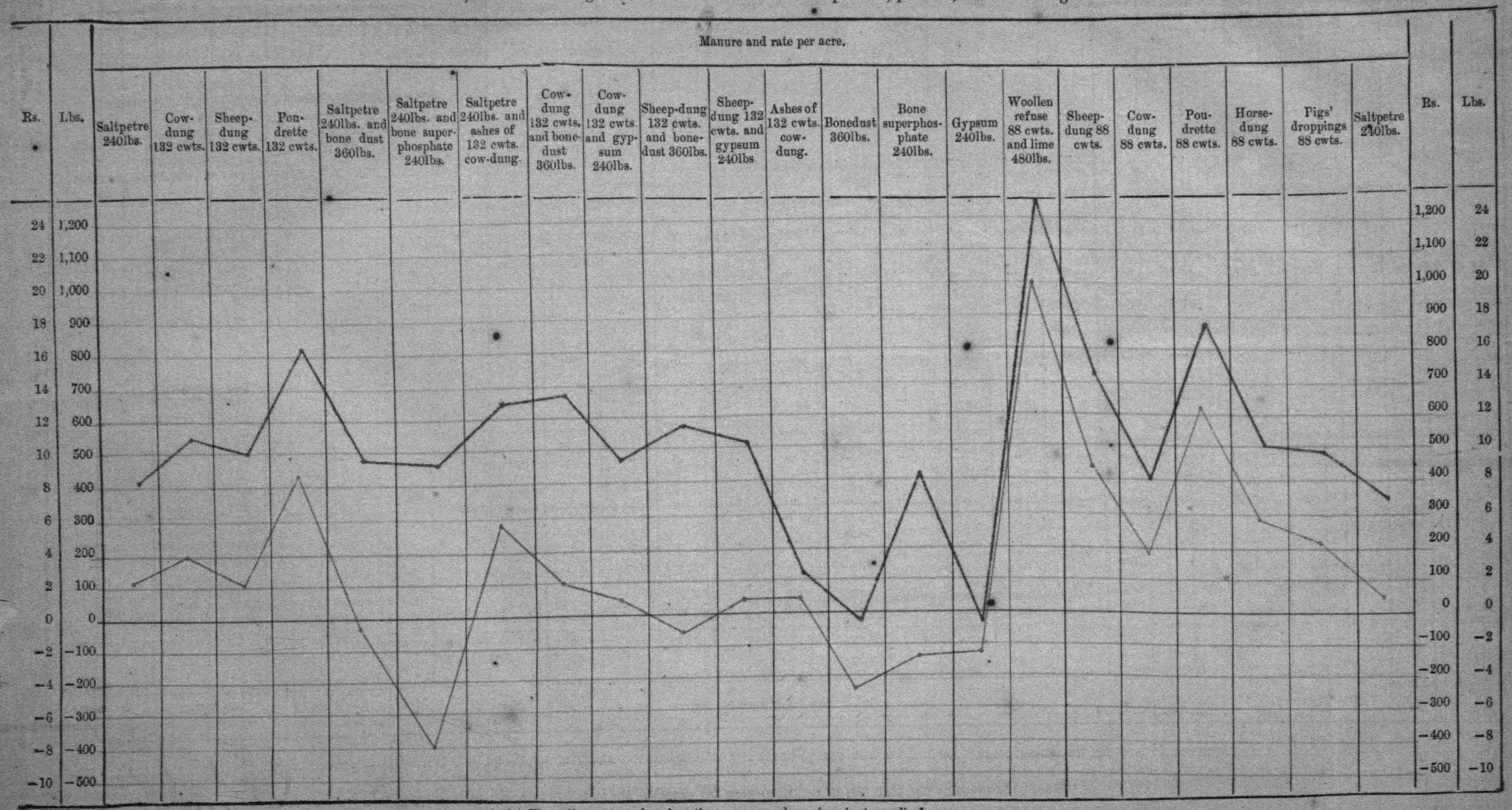
Class.	Experiment.	Crop on which tried.	Series	Serial number.	Special treatment.	Outturn per acre in lbs.										Average outturn per acre in lbs.	Increase per acre in lbs.	Remarks.
						1881-82.	1882-83.	1883-84.	1884-85.	1885-86.	1886-87.	1887-88.	1888-89	1889-90.	1890-91.			
													Grain.	Grain.	Grain.	Grain.	Grain.	
VII—Miscellaneous	Restricting the growth of plant when running to leaf.	Wheat ...	I	1	Grazed by sheep when 1′ high.	...	...	...	...	...	...	...	1,016	1,102	2,148	1,422	368	Compared with the plot left untouched.
				2	Nibbled with a sickle when 1′ high.	...	...	...	...	...	...	...	1,089	1,122	1,053	1,088	34	
				3	Left untouched ...	...	...	...	...	...	...	...	1,041	1,169	951	1,054	...	
								Fibre.			Fibre.	Fibre.				Fibre.	Fibre.	
	To determine the effect of ratooning a cotton crop preserved for next year.	Cotton ...	II	1	Ratooned	...	...	86	...	...	130	85	...	...	...	100	−13	Compared with the unratooned plot.
				2	Unratooned	...	...	108	...	...	145	85	...	...	...	113	...	
													Juice	Juice.	Juice.	Juice.	Juice.	
	Retaining sugarcane for a 2nd crop.	Sugarcane ...	III	1	Outturn of cane planted in the preceding year.	...	...	...	...	...	...	...	5,863	7,480	10,100	7,814	−292	Compared with 1st year's growth.
				2	Outturn of cane planted during the year.	...	...	...	...	...	...	...	8,216	9,418	6,685	8,106	..	
						Grain.		Grain.		Grain.						Grain.	Grain.	
	Preserving the seed from animal depredations by soaking the seed in Jey's purifier.	Wheat ...	IV	1	Soaked in Jey's purifier ...	...	...	1,529	...	...	...	...	...	...	...	1,529	209	Compared with the ordinary way.
				2	Not soaked ditto ...	...	...	1,320	...	...	...	...	...	...	...	1,320	...	
	To determine the effect of alternating wheat with lucerne.	Do. ...	V	1	Alternate with lucerne .	1,395	...	2,284	...	1,488	...	...	...	...	...	1,722	354	Compared with the plot in which wheat is sown every year.
				2	Wheat every year ..	1,289	...	1,503	...	1,313	...	...	...	...	...	1,368	...	

APPENDIX II.

A.—*Diagrams illustrating the effect of certain manures on maize.*

No. 1.—Drawn in green, shows the average increase per acre of grain in lbs. over the unmanured plot.

No. 2.—Drawn in red, shows the average net increase in the value of the produce, per acre, after deducting the cost of manure.

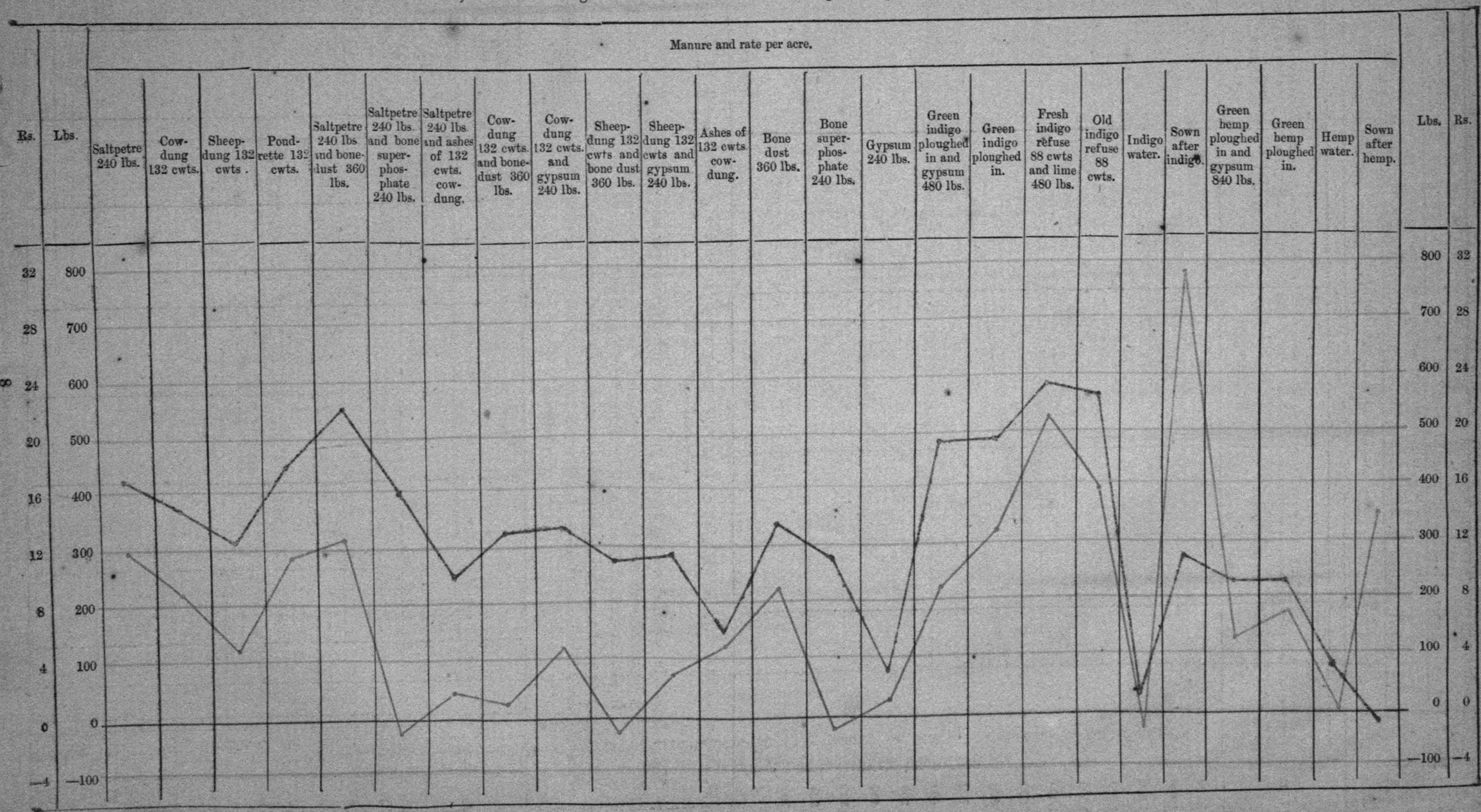


(a) These diagrams are based on the average produce given in Appendix I.
(b) In calculating the value of produce, maize stalks are left out, *vide* para. 8 of the report.

B.—Diagrams illustrating the effect of certain manures on wheat.

No. 1.—Drawn in green, shows the average increase per acre of grain in lbs. over the unmanured plot.

No. 2.—Drawn in red, shows the average net increase in the value of the produce per acre, after deducting the cost of manure.

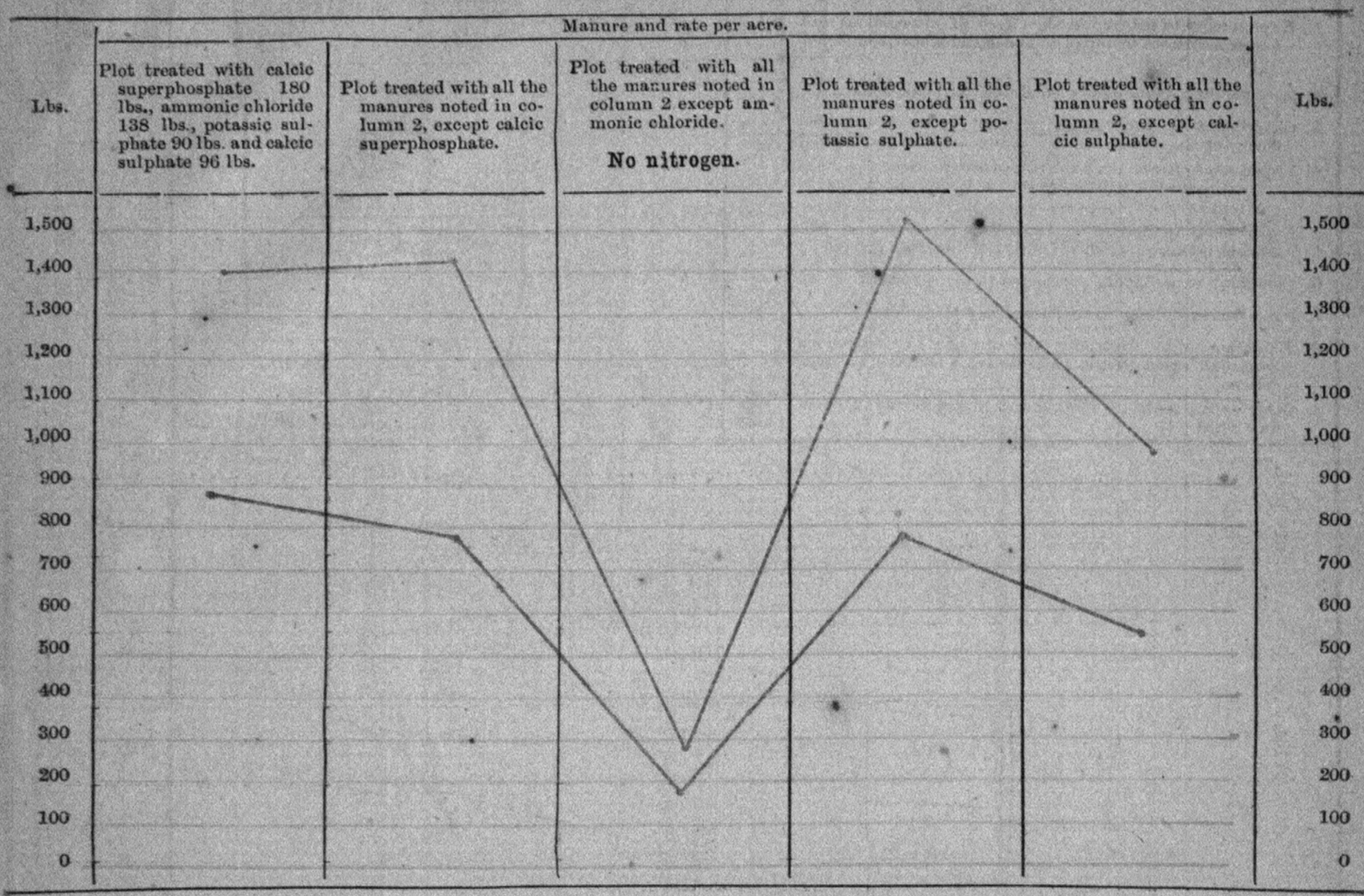


(*a*) These diagrams are based on the average produce given in Appendix I.
(*b*) In calculating the value of produce, value of both grain and straw are taken into account.
(*c*) In the case of plots in which wheat follows a crop of indigo or hemp, the value of the produce of the latter is added to the value of the produce of wheat.

C.—Diagrams illustrating the effect of withholding the supply of nitrogen from a wheat crop.

No. 1 Drawn in green, shows the increased produce, per acre, of grain in lbs. over the outturn of the plot to which no manure was applied.

No. 2 Drawn in red, shows the increased produce, per acre, of straw in lbs. over the outturn of the plot to which no manure was applied.



D. Diagrams illustrating (a) the effect of irrigation in increasing the outturn of wheat and (b) the relative merits of canal and well water.

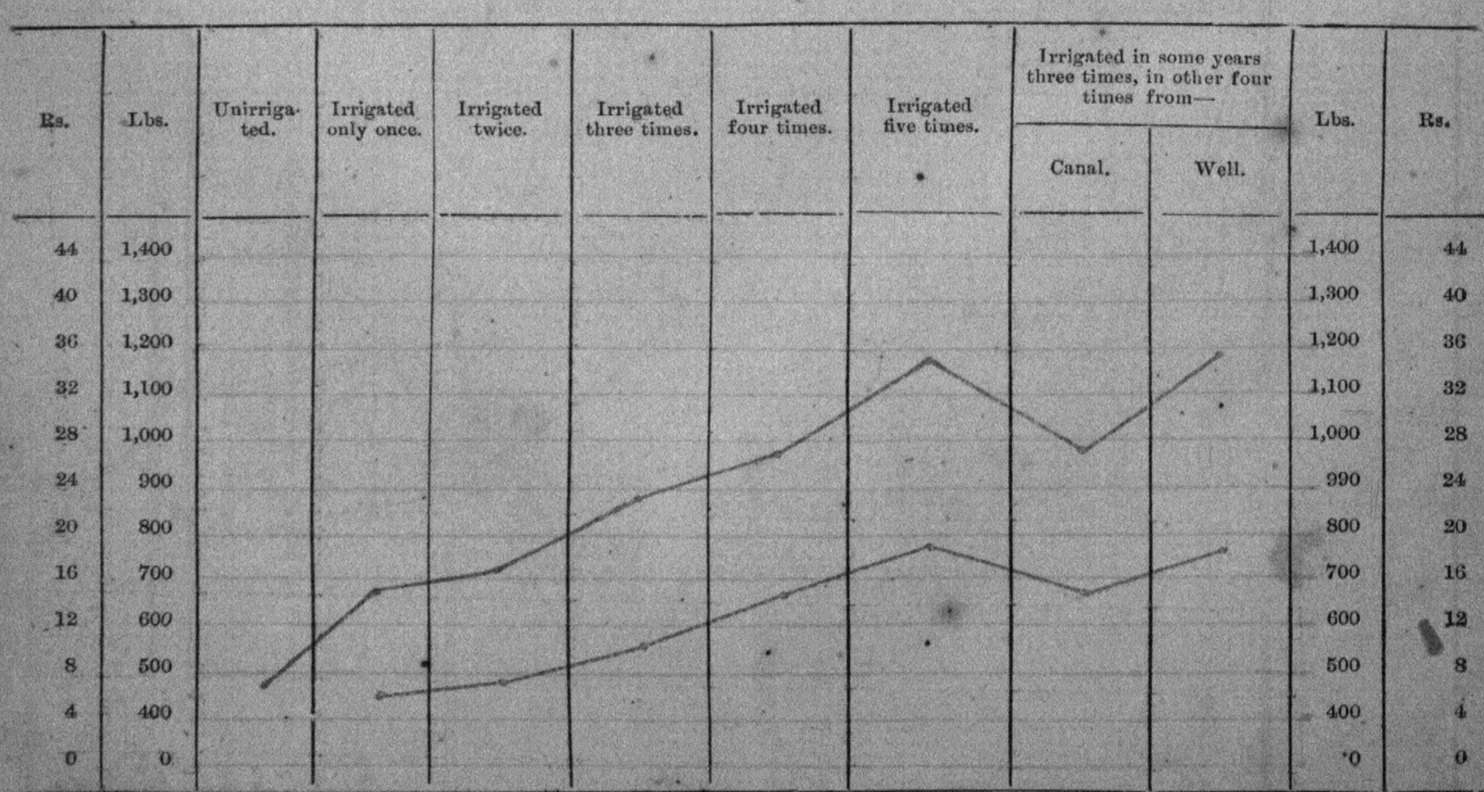
No. 1 Drawn in green, shows the average produce of wheat (grain) per acre—

(*a*) on unirrigated land;

(*b*) on land watered from one to five times from Canal, and

(*c*) on land a portion of which was watered from canal and another from well :—

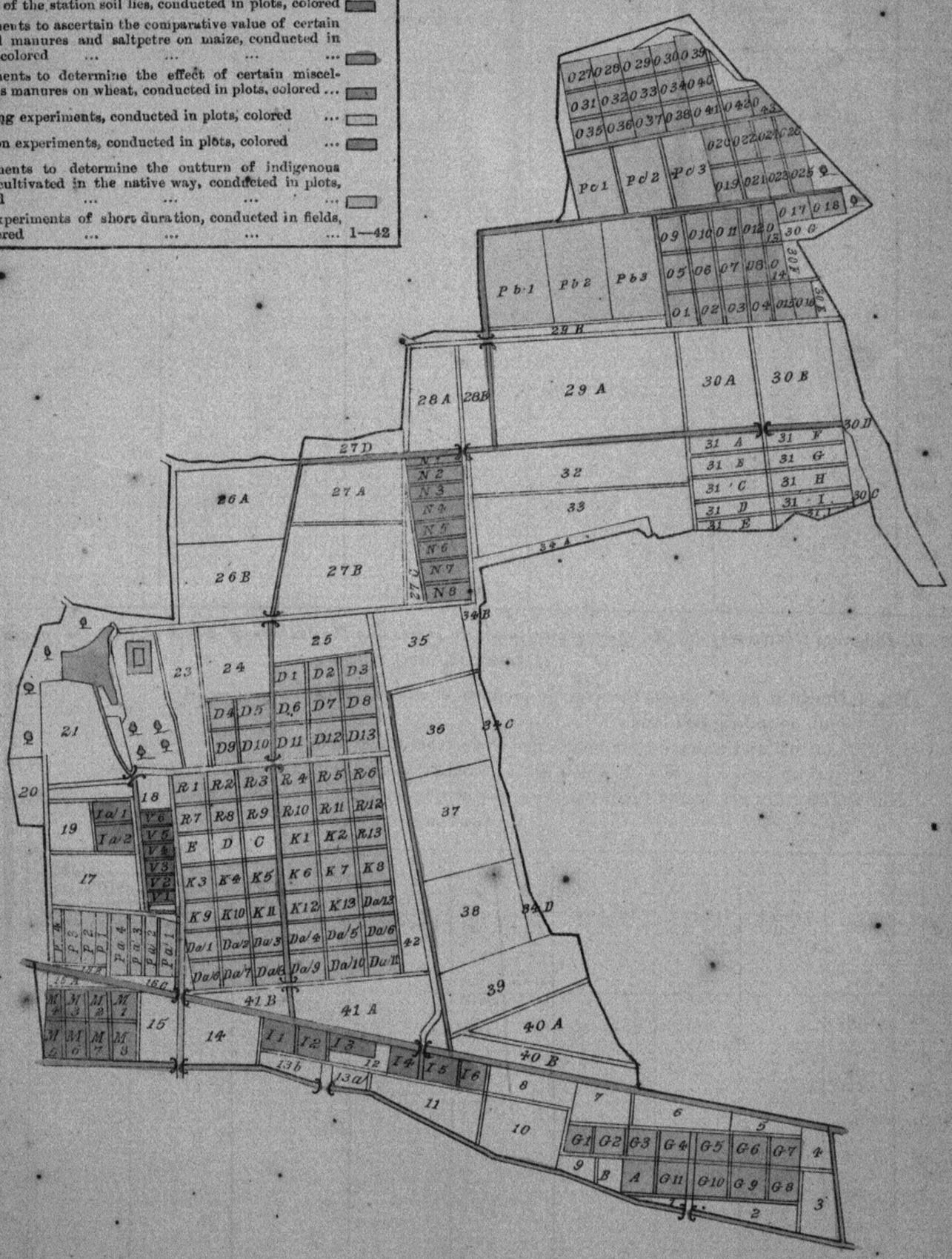
No. 2 Drawn in red, shows the net increase per acre in the value of produce after deducting the extra cost involved in irrigation.



Note.—In calculating the value of produce, value of both grain and straw are taken into account.

Appendix III.

MAP
OF THE
CAWNPORE AGRICULTURAL EXPERIMENT STATION.

EXPLANATION.

1. Experiments to determine the effect of nitrogenous and non-nitrogenous manures on maize and wheat, conducted in plots, colored ... ...
2. Green soiling experiments, conducted in plots, colored ...
3. Experiment to discover the element in which the deficiency of the station soil lies, conducted in plots, colored
4. Experiments to ascertain the comparative value of certain animal manures and saltpetre on maize, conducted in plots, colored ... ...
5. Experiments to determine the effect of certain miscellaneous manures on wheat, conducted in plots, colored ...
6. Ploughing experiments, conducted in plots, colored ...
7. Irrigation experiments, conducted in plots, colored ...
8. Experiments to determine the outturn of indigenous crops cultivated in the native way, conducted in plots, colored ... ...
9. Other experiments of short duration, conducted in fields, numbered ... ... 1—42